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ERRATA.

- Vol. 15, p. 149, BOYD'S Abstract (Trichomonas), last sentence. For "Attempts to infect two rats from the subcultures were not successful," read "One rat was successfully infected from a culture."
- Vol. 17, p. 194, BASSETT-SMITH'S Abstract, in last sentence, for "less" read "more."

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[No. 1.

RECENT PROGRESS IN MEDICAL ZOOLOGY.*

By Lt.-Col. A. ALCOCK, C.I.E., M.B., LL.D., F.R.S., I.M.S. (retd.),
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The War, which made many fastidious men acquainted with strange bedfellows and brought many home-practising members of the profession nearer to the ample page of Nature unredeemed by civilization, has thereby given a great impetus to the study of Medical Entomology.

Medical Entomology, too, during the last decade has become more critical and more formal. We are not now suddenly afraid of an insect merely because it has been caught in the act of sucking blood; nor even when dealing with an arthropod of unquestioned pathogenic significance do we now think that we have done with it once for all by a command that its breeding-places shall be blotted out, or its natural enemies be let loose upon it. The business of medical entomology, as now understood, is, in the case of any species convicted on pathological evidence of being a standing danger to the public health, to unriddle its biology in every detail, and to investigate all the varying circumstances that influence its acquisition and retention of pathogenic capacity. The biological inquest must comprehend every stage of the creature's existence, from the egg to the engendering adult, and must include not only its affinities and its structure, but also its bionomy and its relations to environment. The bionomic inquiry must embrace the geographical distribution and seasonal incidence; the habits and the hours of activity; the powers and range of locomotion and the propensity to spread; the food preferences, meteorological influences, and power of resisting vicissitudes of season and climate; the sexual instincts and fecundity; the mode of reproduction, breeding-places and seasons, and the provision for larvae; and the duration of life in every stage of development. If it be not a specific parasite the bionomic investigation must also include the relations of the species to its environment, organic and inorganic, such as the physiographical and hydrographical features of the habitat, natural shelters, help-givers, parasites, enemies and rivals. An

* It is intended to publish in each number a critical article on recent progress in one of the subjects treated in this *Bulletin*. [Ed.]

excellent example of the range of the inquiry is furnished by SWYNNERTON's "Examination of the Tsetse Problem," published in the *Bulletin of Entomological Research* for March 1921 [see page 22]. With the accumulation of exact information on all these points and the rational inferences drawn from it, medical entomology claims to be a science of practical application in preventive medicine—in short, a branch of Hygiene, and a branch which, although it finds its fullest and most constant application in those tropical countries where sanitary arrangements are still crude and imperfect, cannot in the mutability of human affairs be neglected in any country.

In the following pages some of the more noteworthy contributions of recent years are summarized and digested with particular regard to the interest of readers situated in the tropics.

I. *Culicidae*.

Beginning with the *Culicidae*, the leading place must be given to the great monograph on "The Mosquitoes of North and Central America and the West Indies" (Washington: Carnegie Institute), by HOWARD, DYAR, and KNAB, already reviewed in this *Bulletin* (Vol. 8, pp. 68-71, and Vol. 10, pp. 310-313); for although as regards the specific forms it deals only with the American fauna, yet the broad features of its taxonomy, no less than the critical fullness of its bionomy, give it a cosmopolitan value as the classical work of reference for this group of insects.

1. *Mosquitoes and Malaria*.—Much has been written about the species of *Anopheles* that are susceptible to malarial infection. BARBER in the Philippines and SWELLENGREBEL and his colleagues in the Netherlands East Indies, have carefully investigated this subject in those parts of the Oriental region, where the common *A. ludlowi* has been signalized as a particularly formidable species, as CHRISTOPHERS also had discovered to be the case in the Andamans. In England, BLACKLOCK and CARTER have proved *A. plumbeus*, which breeds wholly in tree-trunks, to be susceptible to infection. Most workers on this subject now realise that while knowledge of specific infectibility under laboratory conditions is valuable, observations of the facts and conditions of infectivity in nature are of much greater practical value, as in any given area they mark out the species that require control. MALCOLM WATSON and SWELLENGREBEL have elaborated this point; the former shows how by indiscriminate clearing of jungle innocent or not very harmful species of *Anopheles* may be eradicated only to open up the way for some extremely dangerous species; and SWELLENGREBEL does not hesitate to propose it as the primary aim of a malaria survey to detect the naturally infected *Anopheles* carriers, and to study their oecology exhaustively, both in the larval and adult stage, so as to concentrate efforts at control wholly on the species that are unquestionably concerned in the local propagation of malaria. ROUBAUD's sapient papers on the spontaneous disappearance of malaria from Western Europe without any correlative disappearance of *Anopheles maculipennis* from the local fauna also point the same moral; according to this author *A. maculipennis* is reluctant to feed in the open, and prefers the blood of domestic animals to that of man, so that under modern conditions in Western Europe the sheds, etc., where domestic animals are housed are a barrier against that perennial communion of man

and Anopheles upon which malaria depends. SWELLENGREBEL also has observed of *A. ludlowi* that although it is a frequent trespasser in native houses it is more remarkably attracted to buffaloes, and he suggests that this preference might be turned to account in attacking this abundant and maleficent carrier of malaria.

2. *Persistence of malarial infection in the mosquito.*—Another subject that has attracted a good deal of attention is the subsistence of malarial infection in the individual Anopheles, particularly with regard to its possible persistence in the insect through the winter. Experimenting with a North American species, MITZMAIN found that in insects infected with the benign tertian parasite prior to hibernation, healthy normal sporozoites did not last through the winter in the salivary glands. ROUBAUD also in France infected Anopheles with crescents in August, and found in the salivary gland, early in January, only a few sporozoites, mostly in a state of degeneration. Again, MITZMAIN exposed infected insects to winter temperatures [Vol. 11, p. 32] and found that even when they were restored to the warmth of the laboratory the infection was not consummated to the sporozoite stage even at the end of 70 days. WENYON, however, working in Macedonia with *A. superpictus*, observed that the development of oöcysts could be arrested for as long as three weeks by cold and then revived by appropriate warmth. Speculation on this interesting subject of hibernation of malaria parasites in mosquitoes is stimulated by the recent researches of MAYER and of MUHLENS. MAYER (*Med. Klin.*, 1920, No. 50) in the autumn infected *Culex* with the *Proteosoma* parasite, and discovered five weeks afterwards that not only the insects' salivary glands, but also all the muscles of the body and appendages, and the palpi, were heavily charged with sporozoites, and that, even 52 days after the infective feed, isolated sporozoites could be detected in the muscles. MUHLENS (*Arch. f. Schiff- und Trop.-Hvg.*, 1921) at the same season infected Anopheles with *Plasmodium vivax*, and 21 to 26 days afterwards found the same heavy generalized sporozoite infection of the insects. Both authors consider this remarkable phenomenon from the hibernation standpoint, and MUHLENS concludes that the matter requires further investigation. Both of them remark that the ovaries were not observed to be infected, though MUHLENS found sporozoites in the vicinity of those organs.

3. *Mosquito Control.*—A prodigious deal has been printed on the subject of malaria-mosquito control, and it must be sufficient now to refer the reader to a few comprehensive and critical papers of recent appearance. First of all, HOWARD, DYAR, and KNAB, and their great monograph, must be mentioned; and then Malcolm WATSON's "Rural Sanitation in the Tropics" (London: John Murray); and the handy and useful volume by LE PRINCE and ORENSTEIN, entitled "Mosquito Control in Panama" (London: G. P. Putnam's Sons). Of papers dealing with the subject from the municipal point of view, as it affects the civilian population, the following are of first-class importance:—HOFFMAN, on the Eradication of Malaria (*Southern Med. J.*, 1917, Apr., and this *Bulletin*, Vol. 10, p. 171); HERMS, on a State Mosquito-Malaria Survey (*Jl. Econom. Entom.*, 1917, June, and this *Bulletin*, Vol. 10, p. 159); DERIVAUX (*Public Health Rep.*, 1918, Aug. 2); WILLIAMS, on Malaria Control (*Southern Med. J.*, 1919, Jan., and this *Bulletin*, Vol. 14, p. 83); and METZ (*Public Health Rep.*, 1919, Jan. 31, and this *Bulletin*, Vol. 14, p. 86); also the recent work of SWELLENGREBEL and his colleagues (this *Bulletin*,

Vol. 14, p. 64 and p. 82, and *Parasitology* for Sept. 1920); and of ROUBAUD, referred to above; and a series of papers by various American authors collectively noticed in this *Bulletin* (Vol. 13, p. 68). Of papers dealing with the subject from the considerably different military standpoint, as affecting armies temporarily encamped in malarious regions, the following are particularly good:—LAVERAN and LEGROUX, in *Bull. Soc. Path. Exot.*, 1917, June, and this *Bulletin*, Vol. 10, p. 172; Edm. and Et. SERGENT, *id.*, 1918, July, and this *Bulletin*, Vol. 12, p. 345; BUSSIÈRE, *id.*, 1918, June, and this *Bulletin*, Vol. 12, p. 346; HAUGHWOUT, *Philippine Jl. Sci.*, Sect. B, 1918, Nov., and this *Bulletin*, Vol. 14, p. 63; AUSTEN, *Trans. Soc. Trop. Med. & Hyg.*, 1919, Nov., and this *Bulletin*, Vol. 15, p. 265.

For the destruction of mosquito larvae several authors have extolled cresol, safe dilutions of 1 part in a million being said to be rapidly fatal. ROUBAUD recommends powdered commercial paraform (trioxymethylene) sprinkled on water, as specifically fatal to mosquito larvae. An ingenious method of distributing petroleum by mooring bags of sawdust, or cotton waste, soaked with it, awash in the current of a stream, or by scattering such sawdust broadcast on boggy ground, has been advocated in America. Two independent observers, METZ and CABALLERO, mention the cosmopolitan water-weed, *Chara*, as being interdictive to *Anopheles* larvae. Much has been written about destructive surface-feeding fish, but the opinion is gaining ground that fish as anti-malarial auxiliaries have but a limited use and under certain artificial conditions where they can be protected and specially assisted.

Among peculiar breeding places of *Anopheles* larvae, besides the now well-known tree-holes and epiphyte plants, the rosettes of *Pistia* have been noticed by MACFIE and others; BOUSFIELD, in Egypt, observed abundant larvae in mud of a pea-soup consistence; METZ speaks of *A. crucians* larvae living happily in water polluted with the refuse of a sulphuric-acid factory; HACKER describes larvae of *A. maculatus* as abounding in a film of oozing water so meagre as to give the appearance of mere wet ground; and DALZIEL observed *A. costalis* breeding in crab-holes and—along with *A. mauritanus*—in roof-gutters.

4. *Stegomyia fasciata*.—CLELAND and BRADIEY have produced satisfactory evidence that, in Australia, this species, and not *Culex fatigans*, is the transmitting agent of the virus of dengue fever; and in Formosa KOIZUMI and others have supplied complete corroboration, and have also inculcated *Desvoidia obturbans*. STANTON, in his eastern survey, did not find *Stegomyia fasciata* in ships at sea, and thinks it unlikely that the insect will take to modern ships of steel. SEIDELIN and Mrs. CONNALL, in West Africa, contradict the statement that maternal females of this species will not bite at night. FIELDING confirms the statement that larvae and pupae can stand complete removal from water for a day or two. MACFIE's experiments show that sudden exposure to a temperature of 44° C. is fatal to both larva and adult, and that 46° C. is fatal to the pupa, and 49° C. to the egg. At the other extreme the experiments of FLU show that adults exposed to a temperature of 6° C. for 24 hours are killed to a certainty, though low temperatures above that limit are not so certainly fatal; while BACOR kept eggs in a cool room (about 9° C.) without impairing their vitality. That this species breeds freely in laboratories in this country is well known, but MACGREGOR raised two males from water taken out of a hole in a tree in Epping Forest.

5. *Mosquito Miscellanea*.—As far back as 1914 ROUBAUD and LAFONT stated that *Stegomyia fasciata* and other Culicines can transmit *Trypanosoma gambiense* and *rhodesiense* mechanically, HACKWORTH and M. BLANCHARD having previously made a similar statement in respect of *Mansonia*. FLU has more recently reported that the plague bacillus can multiply in *Mansonia* and *Culex* and can remain infective in the insects' stomachs, though the insects do not survive.

AUSTEN observed in Palestine that *Anopheles bifurcatus* was wont to bite during the daytime, and that the eggs of *A. turkhudi* are massed in ribands.

II. *Phlebotomus* and other Midges.

In connection with the theory that lizards are the natural hosts of *Phlebotomus* the SERGENT brothers have drawn attention to the fact that at Biskra an Agamid lizard, *Tarentola mauritanica*, which is host of *Phlebotomus minutus* there, is often infected with a Leptomonas and a Trypanosome. Then PARROT has recorded three cases of oriental sore in which the circumstances suggest that lizards of this species were the sources of infection and *Phlebotomus perniciosus* the intermediary (Vol 15, p. 442); and CERQUEIRA records the development of a typical sore at the exact site of a bite of *Phlebotomus lutzi* (Vol 17, p. 366). Of the several species of insects tested by MACKIE (*Indian Jl. Med. Res.*, 1915, Apr., and this *Bulletin*, Vol 6, p. 218) in connexion with the transmission of the kala azar parasite, *Phlebotomus* was one that excited suspicion.

FRANÇA (*Broteria*, Ser Zool., 1919, Vol 17) and FRANÇA and PARROT (*Bull. Soc. Path. Exot.*, 1920, Oct. 13) have revised the genus *Phlebotomus* in monographic style.

In the *Ann. Trop. Med. & Parasit.* for Nov 1920 and Feb. 1921 there is an important paper on the *Ceratopogoninae* of the Gold Coast, by CARTER, INGRAM, and MACFIE. And LUTZ, in *Mem. Inst. Osvaldo Cruz*, 1920, gives a well-illustrated account of the *Blepharoceridae* of Brazil.

III. *Tabanidae*.

PATTON, in a very interesting paper on the gad-flies of Mesopotamia (*Indian Jl. Med. Res.*, 1920, Mar.), records that *Tabanus glaber* is commonly infected with a Crithidia and that the camels on which it feeds are equally commonly infected with a Trypanosome; as the fly is accustomed to defaecate while feeding, and the camel is accustomed to lick the bites, he is inclined to suspect a genetic relation between the two flagellates.

Dr. and Mrs. CONNALL report that in a locality near Lagos where *Filaria loa* is common a remarkable percentage of *Chrysops dimidiata* and a smaller percentage of *C. salacca* were found naturally infected with a *Filaria* of which they have suspicions. The number of flies dissected was 2,255.

MARCHAND has brought out (Monograph of the Rockefeller Institute, 1920, No. 13) a useful monograph on the early stages of *Tabanidae*, with a compendious bibliography.

In an account by AUSTEN of a collection of *Tabanidae* from the archipelagos north of Madagascar, it is stated that two of the species described are so strong on the wing that they fly out to sea to pursue the turtles on which they feed.

IV. *Glossina and Trypanosomiasis in Man.*

The controversy whether—apart from epidemic conditions—human trypanosomiasis is communicated to man by tsetse-flies that have been infected from wild animals in a state of nature, or not, has been reviewed in the *Bulletin* quite recently. On the one hand, in the Uganda Protectorate, DUKE has observed Situtunga antelope naturally infected with trypanosomes having a suspicious resemblance to those of human trypanosomiasis, and, in Nyasaland, KINGHORN and YORKE and BRUCE and his colleagues have observed in wild flies (*G. morsitans* and *brevipalpis*), as well as in game animals, a trypanosome indistinguishable by any morphological characters from *Trypanosoma rhodesiense*. On the other hand, TAUTE inoculated himself (more than once), as well as HUBER and 129 natives, with these rhodesiense-like trypanosomes of natural animal origin and did not obtain a single infection, although laboratory and domestic animals simultaneously inoculated as controls became infected. The logical conclusion from this gigantic experiment is that the rhodesiense-like trypanosome found in nature is not specifically identical with the *rhodesiense* of human trypanosomiasis. YORKE's inference from the experiment is that HUBER and TAUTE and their 129 natives were immune to the parasite, and that man is extremely resistant not merely to this particular "rhodesiense" trypanosome of natural origin, but to trypanosomes in general. But the two sets of facts seem to justify a less strained assumption; for if we may assume—as we surely may—that all specific human parasites must have had an origin outside the human species—must have undergone all but the final touches of their evolution independent of man—we need not be surprised to find a protozoan parasite in nature extremely like one appertaining to man, but lacking the specific character of the latter—in this case the ability to infect the human race. But however we try to reconcile the facts, the results of TAUTE's gigantic experiment weaken the position of those who contend that a standing source of human infection would be for ever effaced by the destruction of the large mammals upon which the tsetse-fly feeds.

On the other hand, when we read the remarkable, if somewhat academic, paper by FISKE in the *Bulletin of Entomological Research* for May 1920, and the supremely fresh and original paper by SWYNNERTON in the same *Bulletin* for March 1921, we are convinced that the control of the tsetse-fly is far from being a question of pure entomology. The adaptations of the fly to the involved conditions of its environment are so perfect that the attempt to unravel them demands, as SWYNNERTON foresees, the co-operation of biologist, entomologist, forest botanist, and field geologist. Nor need the quest seem hopeless; for, as FISKE has divined, the dominant factors in the multiplication of any parasitic species being protective, one very promising method of reducing its numbers is to deprive it of everything that is discovered to be necessary for its protection. As regards *G. palpalis*, FISKE thinks that this might be accomplished by well-planned clearing. SWYNNERTON also remarks of *G. brevipalpis* and *pallidipes* that properly planned settlement is itself capable of cleansing the settled area of these two flies. JACK also, in his report on tsetse-fly in Southern Rhodesia (Vol. 15, p. 163)* mentions a fly zone where the numbers of fly have been reduced—to actual extinction in some places—by the utilization of virgin forest for fuel and industrial purposes, but this zone also had been freely shot by professional hunters

and others. He also thinks that the clearing of a comparatively narrow strip of forest is sufficient to check the spread of fly. DUKE, writing of *G. morsitans*, recommends attack during the dry season, when Nature herself is inauspicious to the fly, by systematic and sustained burning, though also approving of destruction of game. SWYNNERTON also thinks well of *regulated* burning, particularly in the case of *G. brevipalpis*. LLOYD also is of opinion that bush fires are useful in destroying pupae; but LAMBORN and JACK think that mere bush fires are so sudden and transient that they merely char the logs beneath which the pupae are buried, without always killing the pupae.

When one remembers the numerous instances of a species being exterminated in some particular territory, or annihilated altogether, by indiscriminate destruction during the breeding-season, one is constrained to believe that systematic destruction of its pupae must have some effect in reducing the numbers of tsetse-fly. The idea of investigating the oecology of breeding-haunts so as to construct decoy breeding-places, which seems to have been first suggested by AUSTEN, has inspired all recent field workers. LAMBORN considers that the promise of thoughtfully arranged artificial breeding-places is sustained by his experiments, and CARPENTER is well pleased with such experiments independently contrived by himself in East Africa. JACK has made numerous observations of the sites favoured by *G. morsitans* for parturition, and LLOYD has noticed that the breeding-places of this species are always near some particularly heavily-shaded area where the pregnant females can shelter, and near, too, to places where large animals are accustomed to pass frequently.

All observers have paid great attention to the natural enemies of Glossina, no one more than FISKE, who, however, upholds the rational proposition that the fact that a species maintains a robust existence in nature is *ipso facto* evidence of the impotence of its natural enemies. With regard to specific endoparasites, however, the argument is not quite identical; LAMBORN, in a locality in Nyasaland, has something more than a suspicion of the efficacy *per se* against *G. morsitans* of *Mutilla glossinac*, and he has advocated the cultivation and extensive distribution not only of this, but also of other Hymenopterous and Bombyliid endoparasites of Glossina and other indigenous Muscidae.

The supposed numerical preponderance of the male sex in Glossina has been proved to be not a reality, but merely an assumption from the fact that the males, being more persistently on the wing in their sexual ardour, are more frequently caught by collectors.

Though all observers are agreed that *G. morsitans* is remarkably independent of water, particularly during the wet season, and often is indifferent to shade, they note that it cannot dispense with shade in the dry season. LLOYD has observed a considerable mortality of the pupae of this species in the hot season, and LAMBORN states that the pupal stage may be prolonged to ten weeks in dry weather.

As regards *G. palpalis*, SCHWETZ, in his "Recherches sur les Glossines" (Vol. 15, p. 315), records an instance of finding it in a locality in the west of Belgian Congo permanently established in small thickets, sometimes at a considerable distance from water, pigs being present in the said thickets. YORKE and BLACKLOCK mention the discovery of breeding-grounds of this species under oil-palms, not necessarily near water, and FISKE also observed breeding-places 1,100 yards distant from the then existing water-mark of L. Victoria.

Of suggestive observations bearing on the infectivity of the fly, the following are worthy of reiteration:—MISS ROBERTSON, who (*Proc. Roy. Soc.*, 1912, Oct. & Dec., and this *Bulletin*, Vol. 1, pp. 44 & 267) followed out the history of *T. gambiense* in *palpalis*, from the gut to the salivary glands, made the important observation that there are definite periods when the blood of the vertebrate host is not infective to the fly. KINGHORN and YORKE, who (Vol. 2, p. 235) followed the similar development of *T. rhodesiense* in *morsitans*, observed that low temperatures (60°–70° F.) check that development, and that the inhibition may be prolonged at that temperature for at least 60 days, but that by raising the temperature to 75°–85° F. development is resumed and completed.

Of almost purely physiological interest is ROUBAUD's paper (Vol. 15, p. 160) on the symbiotic fungi that occur constantly in certain special cells of the gut of the tsetse-fly, fungi similar to those found constantly in certain other pupiparous flies (*Hippoboscidae*), but not in non-pupiparous blood-sucking Diptera.

V. House-flies.

It would hardly be profitable, even if it were possible, to review all that has been written about the house-fly during the last few years. Although all the secrets of this insect's winter occultation in temperate climates are not fully disclosed, all that the sanitarian wants to know about its active, mischievous, reproductive life has been ascertained. It is known that its standing breeding-haunts are fresh stable-litter, house-refuse, and human faeces, and the principles of treating these breeding foci, according to their nature and the local conditions—by incineration, by packing under pressure so that they may be purged by their own internal fires of ferment, by deep burial and sealing, by desiccation under a tropical sun, by sterilization with safe chemicals like borax and hellebore, by simple traps and pitfalls for maggots—have been abundantly tested and debated. Various effective ways of dealing with adult flies—baited traps, poisons, snares, sprays, screens, etc.—have been approved by experience. And, as regards the dangerous activities of the insect, it is now recognized that they have natural limitations, and that they are chiefly exercised in epidemics of diseases affecting the bowel.

The following books and papers supply a bountiful source of information:—GRAHAM SMITH, "Flies in Relation to Disease. Non-blood-sucking Flies," 2nd ed. (Cambridge Univ. Press); AUSTEN, "The House-fly. Its Life-history, and Practical Methods for its Suppression" (British Museum Publication, 1920 (see this *Bulletin*, Vol. 16, p. 84); RILER, "How to fight the dangerous House-fly" (Univ. of Minnesota, Special Bulletin, 1920, and this *Bulletin*, Vol. 16, p. 107); PATTON, "Mesopotamian House-flies" (*Indian Jl. Med. Res.*, April 1920); DAVIDSON, in *Bulletin of Entomol. Research*, 1918 (Egyptian Campaign); BRAIN, in *Journal of Econom. Entomol.*, 1918 (Remount dépôt in S. Africa); BALFOUR, *Medical Entomology of Salonica*.

The dissemination of cysts of intestinal protozoa by flies has recently been a subject of investigation; ROOT (*American Jl. of Hygiene*, March 1921) in a paper containing a good deal of careful experimental work, gives a critical résumé of the observations of

STILES and KEISTER, KUENEN and SWELLENGREBEL, THOMSON, WENYON and O'CONNOR, and ROUBAUD. To this list may be added a paper by BUXTON (Vol. 16, p. 1), giving his experience in Mesopotamia of flies as carriers of cysts of protozoa.

VI. Myiasis.

1. *Oestridae*.—A considerable number of cases of dermal myiasis have been recorded, due to these parasitic maggots. Two authors—DA MATTA in *Amazonas Med.* for 1920, and MAGATH in *Arch. Dermat. & Syph.* for 1920—have dealt very comprehensively with *Dermatobia hominis*, which is now known to plant its eggs not only on *Janthinoma*, but also on the house-fly, *Stomoxys*, *Anthomyia*, and various other flies. NEIVA and GOMES observed that the larvae did not emerge until the egg was brought near a warm skin, and that even then they would retire within the egg if they could not reach the prospective host. LUTZ, in an experiment upon himself, found that the larva took more than an hour to work through the skin and caused only a slight burning pain in the process. Additional cases of dermal myiasis in man by *Hypoderma bovis*, and of nasal and ocular myiasis by *Oestrus ovis* and *Rhinocestrus nasalis*, have also been recorded. Finally, PATTON's account of the bot-flies of Mesopotamia (see below, p. 21) is full of interesting biological details of this family.

2. *Muscidae*.—The old generic name of the American screw-worm, *Chrysomya*, and of the Oriental screw-worm, *Pycnosoma*, have suffered a deplorable change, TOWNSEND having discovered that the former name, *Chrysomya*, belongs by law of priority to an old-world type of blow-fly with which the species hitherto included in *Pycnosoma* are congeneric. The old-world screw-worms formerly known as "*Pycnosoma*" therefore must now be called *Chrysomya*, and the American screw-worms formerly known as "*Chrysomya*" must henceforth be called by TOWNSEND's new name, *Cochliomyia*. This change has been adopted by PATTON, and, as I am informed by Major AUSTEN, is accepted.

DUNN (Vol. 17, p. 123) has given a good account of *Cochliomyia macellaria*, the American screw-worm fly, its life-cycle, and its tendency to spread. ZEPEDA (Vol. 2, p. 528) observed the eggs of this species on mosquitoes. ALMEIDA also (*Archivos Brasileiros de Med.*, April 1917, and this *Bulletin*, Vol. 16, p. 109), in an article on nasal myiasis, deals with this species and gives numerous references to other records.

In the *Indian Jl. of Medical Research* for July 1920, there is a finely illustrated paper by PATTON on myiasis due to the Oriental screw-worm fly, *Chrysomya bezziana*, which this author considers to be as plentifully harmful to man and animals in India as *Cochliomyia macellaria* is in America.

3. *Syrphidae*.—HALL and MUIR (*Arch. Internat. Med.*, 1913; see this *Bulletin*, Vol. 2, p. 533) give an account of a case of intestinal myiasis due to the maggots of *Eristalis* and a summary of previous similar cases.

VII. Bionomy and Pathonomy of Fleas.

1. *Fleas and Plague*.—A flood of light has been thrown on the life-history of these sequestered insects by BACOT (*Jl. of Hygiene*, Plague Suppl. III, Jan. 1914). He has shown that the adult flea is a fairly long-lived insect; the human flea, for instance, if allowed to feed

regularly, surviving up to 513 days; and that even under starvation they can hold out for a long time (the European rat-flea for 95 days, and the tropical rat-flea for 38 days) provided the atmosphere is moist and not too hot, but that they cannot tolerate an atmosphere of dry heat. His laborious observations also show that although the larval and pupal stages may normally be accomplished quickly, they may be prolonged in a quiescence that may last for many months; this quiescent stage in the European rat-flea, for instance, being capable of extending to at least 600 days. In collaboration with RIDWOOD he has also published (*Parasitology*, June 1914) a very complete account of the flea larva.

He has also published (*Jl. Roy. Sanit. Inst.*, 1919; see also this *Bulletin*, Vol. 16, p. 44) a list of the fleas found on rats and their relations severally to plague.

On the pathological side BACOT, in collaboration with MARTIN, has demonstrated (*Jl. of Hygiene*, Plague Suppl. III) how, in the proventricle and stomach of fleas fed on heavily infected (septicaemic) plague rats, the bacilli may multiply so enormously as to cause a mechanical obstruction there; so that when the obstructed flea attacks other victims, which its urgent but frustrated thirst for liquid makes it eager to do, its efforts at suction may lead to a reflux current from the infected obstruction, and its bite may therefore be infective; furthermore, such an obstructed flea may recover, but in that case a residue of the infective focus in the proventricle and stomach may persist for the rest of life. This author has also shown that the European rat-flea infected in the ordinary way from mice suffering from septicaemic plague and kept at a mean temperature of about 45° F. may retain the infection for about 67 days.

2. *Fleas and Leishmaniasis*.—Much has been written about the transmission of *Leishmania* from dog to dog and from dog to human beings, in the Mediterranean zone by the dog-flea, and of the possibility in the latter case of the flea's own *Leptomonas* (or *Herpetomonas*) having been misinterpreted as the flagellar form of the *Leishmania*; this *Bulletin*, from Vol. 1, pp. 366, 368 and 632 onwards, to Vol. 15, pp. 439–441, teems with abstracts of papers on this subject, the last of which, by TYZZER and WALKER, is a record of experiments that supports the view that the *Leptomonas* of the dog-flea is specifically distinct from the flagellar form of the *Leishmania*.

3. *Geographical Distribution of the Human Flea*.—A question has lately been raised on this subject. Most people have assumed, without investigation, that the fleas infesting mankind are everywhere *Pulex irritans*, but this very natural assumption has recently been challenged, at least as regards the plains of the tropics. *Pulex irritans* almost certainly occurs in the plains of India; BACOT and others have observed it in Upper Egypt, and CUNHA records a variety of it in Brazil. Other exact records are desirable.

VIII. *Bed-bugs and other Rhynchota.*

1. *Biology and Pathogenic Significance of Bed-bugs*.—In the *Indian Journal of Medical Research* for July 1920, there is an important paper by CRAGG on the phenomena of reproduction in the bed-bug. It is a paper that deserves recognition far beyond the field of Medical Entomology. The author describes the extraordinary course taken by the spermatozoa in their progress to the ovary. Being introduced into the organ of Ribaga, they filter into the organ of Berlese and

reach the spermathecae by way of the body cavity; from the spermathecae they travel not in the lumen of the oviduct, but in the substance of the oviducal wall. The author considers that the spermatozoa discharge other functions besides fertilizing ova, and opens up some suggestive lines of speculation.

In France lately the vapour of chloropicrine has been extolled as an insecticide, particularly as a cimicide (Vol. 15, p. 166). In the *U.S. Public Health Reports*, 1919, Nov. 28, a convenient way of exterminating bed-bugs in buildings heated with steam radiators is described; all doors and windows are shut, and by raising the steam pressure the temperature is maintained at 160° F. for three hours. BLACKLOCK (Vol. 1, p. 584) has experimented with various cimicides, and finds the old-fashioned SO₂ cheap and effective, an opinion with which many will agree.

The theory of transmission of *Leishmania donovani* by bed-bugs has been investigated experimentally by several authors, and very extensively by MACKIE and by CORNWALL. MACKIE (Vol. 2, p. 431; Vol. 5, p. 262; and Vol. 6, p. 218; but see, in particular, *Indian Jl. Med. Res.*, 1915, Apr.), as the result of several thousand observations and experiments with bed-bugs, is unable to produce any evidence in support of the theory; only once after feeding 70 bugs on a patient having parasites in the peripheral blood did he find parasites in the insect, and then only in one or two individuals and only on the day after the infective feed. CORNWALL (*Indian Jl. Med. Res.*, 1916, Apr. and July; 1917, Apr.; and 1918) found in the stomach of bugs fed on *Leishmania*-cultures certain curious forms of the parasite, with coarse flagellum ("thick tails"), but was unable to effect transmission by the bite, nor could he discover any live infection in the insect's faeces, and the only conclusion he can admit is that if an infected bug were squashed on an excoriated skin infection might possibly be transferred. FRANCHINI also fed about 300 bugs (Vol. 1, p. 369) on rich *Leishmania*-cultures and found traces of flagellar forms only in six.

BACOT has confirmed the statement that the plague bacillus can live with unabated virulence in the bed-bug. In his experience the bacillus survived and was effective for 48 days, but most adult bugs die of the infection, and probably all young bugs would die. CORNWALL and MENON also in one case found the bacillus surviving with unaltered powers for 38 days, but they did not succeed in getting infection transmitted to animals by bite of infected bugs.

ARKWRIGHT, AITKEN and BACOT, in the latest issue of *Parasitology* (1921, Mar.), give an account of an inheritable Rickettsia-like parasite of the bed-bug.

2. *Reduviid Bugs and Trypanosomiasis*.—Another species of Reduviid bug, *Rhodnius prolixus*, has been observed to harbour *Trypanosoma cruzi*; and TEJERA (Vol. 17, p. 97) has described what he thinks to be a new species of trypanosome, and names *T. rangeli*, associated with *T. cruzi*, in this bug.

3. *Leaf-Hopper Bugs*.—As a curiosity these tiny Cicada-like bugs of the family *Jassidae* may suck blood. BANKS, in the Philippines, has noticed this aberration in *Nephotettix apicalis* and *N. punctatus* (the latter species being the little "green bug" harbingers of the cold season in Lower Bengal); and DONOVAN, in Madras, has noticed it in *Phrynomorphus indicus*. [BANKS also speaks of a Thrips that sucks blood.]

IX. *Blood-Sucking Lice.*

During the last decade the old vague traditional association of lice with typhus fever, and the connexion between lice and relapsing fever postulated by MACKIE, have been clearly defined and formulated, and as a result of the war another louse-borne disease, trench fever, has been exactly defined [BYAM and colleagues, *Trans. Soc. Trop. Med. & Hyg.*, 1918, and "Trench Fever, a Louse-borne Disease" (Clarendon Press, 1919); STRONG and colleagues, "Trench Fever: Report of Commission of American Red Cross Research Committee" (Oxford University Press, 1918); also ARKWRIGHT, BACOT, and DUNCAN, *Trans. Soc. Trop. Med. & Hyg.*, 1919].

The series of papers by NUTTALL (*Parasitology*, 1917, Feb. and Nov.; and 1919, Feb. and Oct.), and the papers by BACOT (*Parasitology*, 1917, Feb.; and *Proc. Roy. Soc. Med.*, 1917), and by PEACOCK (*Parasitology*, 1918, Nov.), together constitute an exhaustive account of the louse. A useful summary, embodying all recent contributions to knowledge, is LLOYD's "Lice and their Menace to Man" (Vol. 13, p. 256).

MITZMAIN, in the course of an investigation of the biting flies of the Philippines, made the interesting observation that of 1,800 specimens of *Lyperosia* examined 620 carried buffalo-lice.

X. *Insect Flagellates.*

A great deal has been written about the intestinal flagellates of insects, particularly suctorial insects, and the contingency of their transference to, and pathological transformation in, Vertebrates—a subject of great interest. LAVERAN and FRANCHINI, whose numerous papers have been abstracted in volumes of this *Bulletin* since 1913, conclude from their various and reiterated experiments that such flagellates can be transferred to Vertebrates and are pathogenic to their vicarious hosts, ultimately infecting various organs of the vicarious host (spleen, liver, bone-marrow, etc.) with leishmaniform parasites. FANTHAM and PORTER, whose investigations were published in the *Proceedings of the Cambridge Philosophical Society* for 1915 and the *Annals of Tropical Medicine and Parasitology* for the same year, and are summarized in the *Journal of Parasitology* for 1916, also express the opinion that no insect flagellates may be presumed to be harmless to man, and uphold the theorem that all the various manifestations of leishmaniasis affecting Vertebrates will probably turn out to be vicarious herpetomoniasis of insects.

This hypothesis, however, has been consistently opposed by WENYON and others; and HOARE, in a recent paper (*Parasitology*, 1921, Mar.), gives a critical account of his repetitions of certain of the above-named authors' experiments, in which his results have been entirely negative. HOARE adds the damaging criticism that some of the experiments of LAVERAN and FRANCHINI are difficult to understand; for instance, those authors obtained *Leishmania*-forms in mice by infecting them with the Crithidia of the Ked (*Melophagus*), which NÖLLER has shown to be the antecedent form of the sheep trypanosome (*T. melophagium*). HOARE's conclusion of the whole matter is that although FANTHAM's interesting hypothesis may prove to be correct, the facts at present available do not support the inference that the herpetomoniasis of insects, especially insects not associated with vertebrates, may become pathogenic when introduced into vertebrates. A useful list of references is annexed to this paper.

XI. Ticks.

References to tick-bite paralysis will be found in this *Bulletin*, Vol. 2, pp. 204 and 205; Vol. 3, p. 231; and Vol. 5, p. 433, and in NUTTALL's papers in *Parasitology* for May and October, 1914.

MARTIAL and SENEVET (*Bull. Soc. Path. Exot.*, 1921, Jan. 12) record the occurrence of *Ornithodoros talaje* in Fez, and the effect of its bite—delayed collapse and a long-enduring and intense itching.

RODHAIN (Vol. 15, p. 166) records the infestation of the tree-trunks in a grove of mangoes by *Ornithodoros moubata*. DRAKE-BROCKMAN (Vol. 7, p. 122) has some remarks on the habits of *O. savignyi*; in Somaliland, as in some parts of West Africa, it is active by day and attacks domestic animals.

Another instance of the endurance of *Argas reflexus* has been recorded (Vol. 17, p. 126), living individuals of this species having been found in a Nancy pigeon-house which was known to have been untenanted by pigeons or other birds for six years.

S. B. WOLBACH's monograph on Rocky Mountain Spotted Fever (*Jl. of Medical Research*, Vol. 41, No. 1, 1919; this *Bulletin*, Vol. 16, p. 420) gives a full account not only of the pathology and parasitology of the disease, but also of the usual tick-carrier, *Dermacentor venustus*—its anatomy, habits, hosts, biology and susceptibility and retention of infection. The history of the subject is also reviewed, from the early days in 1890-95, when the disease first attracted attention, and from the early controversies as to its nature and causation, to the time of RICKETTS (1906), who proved by experiments upon susceptible animals that it was due to an inoculable virus communicated by certain ticks and transmissible from one generation of infected ticks to another. The details of numerous original transmission-experiments are recorded, confirming, *inter alia*, the fact that the adult tick becoming infected is infective *per se*, and showing that a nymph acquiring the infection becomes infective on attaining the adult stage; and also demonstrating that the parasite infects the ova and the spermatozoa of the tick. The author considers that hereditary transmission is an important factor in the natural maintenance of the disease, and thinks it possible that the virus may subsist through many generations of ticks without fresh infection from outside.

XII. Mites.

Fresh cases of dermatitis due to *Pediculoides ventricosus* have been described, and also of dysenteric diarrhoea caused by mites in the bowel. CARNEGIE DICKSON (*Jl. Trop. Med. & Hyg.*, 1921, Feb. 1) has given an account of two cases of cystitis and apparent renal trouble due respectively to *Alcurobius farinae* and to Tarsonemid mites in the bladder.

The identification of the several species of *Demodex* mites is now facilitated by HIRST's Monograph, reviewed in this *Bulletin*, Vol. 15, p. 88.

WARBURTON's compilation on Sarcoptic itch in Man and Animals (*Parasitology*, 1920, Sept.) is a useful work of reference.

XIII. Venomous Spiders.

The papers of ESCOMEL on *Lathrodectes* (Vol. 17, p. 126) and on *Glyptocranium* (Vol. 13, p. 56) contain an exact account of the venom of two small but dangerous spiders. Both venoms are powerfully

haemolytic and cytolytic, and that of *Lathrodectes* also contains an active neuro-muscular toxin. From these and other authentic accounts it appears to be confirmed that the bite of these spiders may sometimes be fatal to man—particularly that of *Glyptocranium gasteracanthoides*.

XIV. *Porocephalus*.

Infestation with the encysted larvae of *Porocephalus* seems to be common in tropical Africa; MOUCHET writes of 22·56 per cent. of his post mortems at Leopoldville revealing them in the abdominal viscera and lung. FULLEBORN (Vol. 15, p. 171) has followed the life-history of *Porocephalus* experimentally, from the eggs obtained from a Python, through a monkey fed on the eggs, to grass snakes fed on encysted larvae removed from the viscera of the monkey.

XV. *Copepoda and Ribbonworm*.

JANICKI and ROSEN (Vol. 17, p. 64) have at last followed out the post-embryonic development of *Dibothriocephalus latus*. The oncosphere larva is ingested by *Cyclops strenuus* and another species of Copepod, *Diaptomus gracilis*, but chiefly by the former. In the body cavity of the Copepod it attains the procercoid stage, and the development is further continued in fresh-water fishes that swallow the infected Copepods. It may be mentioned that *Cyclops strenuus* has a wide distribution, occurring in England and at least as far east as India.

XVI. *Miscellanea*.

CORNWALL and PATTON (*Indian Jl. Med. Res.*, 1914, Oct) found that the saliva of *Philaematomyia insignis* and of *Tabanus albimediis* contains a powerful anticoagulin.

COPPIN (Vol. 15, p. 170) gives an account of a case of Centipede bite in Southern India. The immediate effects of the bite were pain and vomiting, followed by a bullous local eruption and later by a much more general papular and vesiculous eruption resembling chicken-pox or smallpox and ending in desquamation. This is in considerable contrast with the effects of the venom of the three Indian species of Centipedes studied by CORNWALL.

MEDICAL ZOOLOGY.

HEGNER (R. W.).

i. **Medical Zoology in Europe.**—Reprinted from *Science*. N.S. 1920. Dec. 24. Vol. 52. No. 1356. pp. 591–597.ii. **The Relation of Medical Zoology to Public Health Problems.**—*Jl. Amer. Med. Assoc.* 1920. Dec. 11. Vol. 75. No. 24. pp. 1607–1610.

HEGNER (R. W.) & PAYNE (George C.).

iii. **Surveys of the Intestinal Protozoa of Man, in Health and Disease.**—Reprinted from *The Scientific Monthly*. 1921. Jan. pp. 47–52.

i. A short account of a tour of inspection of the principal institutions for biological research in Europe. The author is impressed with the attention given to medical zoology, and although he admits that the war has increased the general interest in that subject, he thinks that it has drained the resources of Europe, and that the lead in medical zoology, as well as in other branches of science, must therefore pass to the United States. This is the modern materialistic view, which forgets that the soul is more than raiment.

ii. This is a discerning survey. The author recognizes—as is generally recognized abroad, but is not always so clearly understood in this country—that from the sanitary standpoint protozoology, helminthology, and medical entomology “have much in common, and must be intimately associated.”

iii. A useful survey, but not containing anything novel, and not quite complete.

A. Alcock.

MAPLESTONE (P. A.). **Human Intestinal Protozoa in North Queensland.**—*Ann. Trop. Med. & Parasit.* 1921. Feb. 8. Vol. 14. No. 3. pp. 283–293.

The investigation was undertaken to ascertain if carriers of *Entamoeba histolytica* exist among the healthy population of Northern Queensland. One examination of one stool of each of 500 people was made, and cysts of that parasite were found in 23, i.e., 4·6 per cent. Of these 23 people all, with one exception, had lived in their present houses many years, in most cases all their lives, the exception being a man who had served in the war for three years (but had never had dysentery or diarrhoea).

Other cysts found in the 500 cases were *E. coli* 26·4 per cent., *Giardia intestinalis* 11·8 per cent., *Chilomastix mesnili* 2·2 per cent., and in 1·8 per cent. a small cyst very much like *E. nana*.

A higher percentage of protozoon infections was noticed in children and young adults than in older people.

A. A.

PRINGAULT (E.). **Le parasitisme intestinal dans la région marseillaise.**—*Bull. Soc. Path. Exot.* 1921. Mar. 9. Vol. 14. No. 3. pp. 151–155.

The desirability of eliciting a systematic “index of intestinal parasites” for each politico-geographical area is suggested, and the author here presents *in limine* the tabulated results of examination of 943 stools (presumably of as many different individuals) of various hospital

patients of Marseilles. The list of parasites is as follows, in percentages : *Amoeba coli*, 9·01, rarely found in children ; "*Amoeba dysenteriae*," 4·66, very rare in patients under 20 years ; *Lambliia intestinalis*, 2·96, usually in adults ; *Trichomonas intestinalis*, 0·6, commonly in liquid stools of children suffering from diarrhoea, once in the stool of a female typhoid fever patient. *Spirillum* sp., described by LE DANTEC, five times—once associated with *Trichomonas intestinalis* and *Blastocystis hominis*. *Oxyuris vermicularis*, 11·87 ; *Trichocephalus trichuris*, 8·16 ; *Ascaris lumbricoides*, 8·15 ; *Taenia saginata*, 2·54 ; *Taenia solium*, 0·10 ; *Bothriocephalus latus*, 0·21.

A. A.

Root (Francis Metcalf). **Experiments on the Carriage of Intestinal Protozoa of Man by Flies.**—*Amer. J. Hyg.* Baltimore. 1921. Mar. Vol. 1. No. 2. pp. 131–153. With 3 plates.

In the historical introduction the author refers to the work of STILES and KEISTER [this *Bulletin*, Vol. 3, p. 92], KUENEN and SWELLEN-GREBEL [*loc. cit.*, p. 76], the THOMSONS [Vol. 8, p. 437], WENYON and O'CONNOR (Wellcome Bureau of Scientific Research : Human Intestinal Protozoa in the Near East, 1917), and ROUBAUD [this *Bulletin*, Vol. 12, p. 1], and reviews the present state of knowledge of the subject, and then describes the methods and results of his own work. For most of his experiments he used *Musca domestica* and *Calliphora erythrocephala*, reared in the laboratory, but other species and also caught flies were sometimes employed. Flies were used either as soon as they had hardened after emergence, or when they had been kept for several days on syrup. In feeding for most of the cyst experiments the cysts were washed and concentrated ; in all the experiments with free protozoa, and in a few of those with cysts, plain fresh faeces were used. To determine whether ingested cysts were alive or dead neutral red was preferred to eosin, since it seemed to be a more delicate and more transparent stain. The following is a statement of results :—

Entamoeba histolytica. All the cysts came from a single stool. Cysts were found in 29 flies dissected at different times after feeding. No dead cysts were found for two hours. Half the cysts were dead after 15 hours. The last living cysts were found in two flies dissected 49 hours after the feed.

Entamoeba coli. The cysts used came from three sources. Cysts were found in 75 flies dissected. Death of cysts began to occur at the end of two hours. Half the cysts were dead in 14, 16, and 18 hours in the three series. The last living cyst was found in a fly dissected 52 hours after feeding.

Endolimax nana. All the cysts came from a single source. Cysts were found in 22 flies dissected. No death of cysts for two hours. Half the cysts were dead in 18 or 19 hours. The last living cyst was found 39 hours after the fly was fed.

Giardia intestinalis. Cysts from three sources. Cysts found in 40 flies dissected. No death of cysts for one hour. Half the cysts dead in eight hours. Last living cyst in a fly dissected 16 hours after the feed.

Ghilonaxstix mesnili. Cysts from a single source. Cysts found in 22 flies. No death of cysts for at least two hours. Half the cysts dead after 36 hours. The last living cysts found had been in the fly's gut for 80 hours.

Survival of cysts in drowned flies. The author confirmed ROUBAUD'S experiment demonstrating that cysts of *Entamoeba histolytica* remained alive for at least a week in the gut of drowned flies.

Survival of free forms. The author confirmed ROUBAUD'S experiment showing that free amoebae swallowed by flies die within an hour, never encysting; and he also verified with *Chilomastix mesnili* the experiment of WENYON and O'CONNOR with *Trichomonas*, showing that the free flagellates may pass through a fly's intestine and appear alive in the insect's faeces in a few minutes, though they die within an hour if retained in its intestine.

A. A.

BARRAUD (P. J.). **Mosquitos Collected in Palestine and Adjacent Territories.**—*Bull. Entom. Res.* 1921. Mar. Vol. 11. Pt. 4. pp. 387-395.

An annotated list of the local Culicidae. A pale variety of *Anopheles maculipennis* is generally distributed in Palestine, Syria, and Cilicia, sometimes bites in the daytime, and sometimes breeds in brackish water. *A. bifurcatus* is the most abundant domestic Anopheles, and breeds almost exclusively in deep cisterns of rainwater and covered surface wells. Other common species are *A. "hyrcanus"* (= *sincensis*), *A. superpictus* (= *palestincensis* and *nursei*, Theob.), *A. multicolor* (= *chaudoyei*, Theob.), and *A. mauritanus*. Rarer species are *A. algeriensis*, *A. culicifacies* var. *sergenti*, and *A. pharoensis*. Seventeen species of Culicini are enlisted, including *Stegomyia fuscata* and *Culex pipiens*, which is very abundant.

A. A.

CHRISTOPHERS (S. R.). **A Summary of Recent Observations upon the Anopheles of the Middle East.**—*Indian Jl. Med. Res.* 1920. April. Vol. 7. No. 4. pp. 710-716. With 3 maps.

An interesting discussion of the geographical distribution of the Anophelines of that arid tract where Palaearctic, Ethiopian and Oriental zoogeographical regions meet.

A. A.

HERMS (William B.) & FREEBORN (Stanley B.). **The Egg Laying Habits of Californian Anophelines.**—*Jl. Parasit.* 1920. Dec. Vol. 7. No. 2. pp. 69-79. With 2 text figs.

An individual *Anopheles punctipennis* (in captivity) was observed to rest on the water during the process of parturition. The average number of eggs laid at one course was for *A. quadrimaculatus* 209 and for *A. punctipennis* 203, in the authors' observations. In the former species the eggs hatched in 2.5 days, in the latter species in 3.2 days, and in *A. pseudopunctipennis* in 3 days. The eggs of Californian species [like those of British species—as MACGREGOR has observed] have specific differentiae. In the egg of *A. pseudopunctipennis* the "floats," which are small, are juxtaposed on the dorsal surface, and, further, at the narrower end of the egg the membranous covering stands out free like a collar. The authors think that the species of *Anopheles* observed by them exercise some selection of breeding place.

The eggs of *A. quadrimaculatus* were found to endure drying for 72 hours, but those of *A. punctipennis* failed to hatch after 24 hours drying.

A. A.

BLACKLOCK (B.). **Tree - Breeding Anophelines.** — *Lancet*. 1921. Mar. 12. pp. 530-531.

The writer draws attention to the necessity of considering the tree-breeding species of Anopheles in any survey of a malarious district where trees are present. And he points his remarks by a reference to his own and CARTER's success in infecting the British tree-breeder, *A. plumbeus*, with malaria experimentally. [He is not quite correct in stating that *A. plumbeus* is the only British species in which infection has been carried experimentally to the sporozoite stage in the salivary glands, because this has been done at the London School of Tropical Medicine with *A. maculipennis*.]

A. A.

PRINGAULT (E.). **Capture dans les Bouches-du-Rhône de *Theobaldia spathipalpis* (Rondani).**—*Bull. Soc. Path. Exot.* 1921. Mar. 9. Vol. 14. No. 3. pp. 163-164.

This species is distributed not only all round the Mediterranean basin but also in Madeira, Teneriffe, the Sudan, and Northern India.

The author found the larvae in a marsh where larvae of dragonflies and ephemerids were also present, and ducks and geese were frequent visitors. The life-cycle at 20-25° C., the mean temperature of August-September in the author's locality, takes 20 to 25 days.

A. A.

SÉGUY (E.). **Note sur la détermination de nos Culicides indigènes.** — *Bull. Soc. Path. Exot.* 1921. Mar. 9. Vol. 14. No. 3. pp. 179-187.

Synoptical tables for identifying the adults and the larvae of the mosquitoes of France. The author divides them to begin with in three sub-families—*Culicinae*, *Aëdinae*, and *Anophelinae*. "*Stegomyia fasciata*" appears under a new alias—*Aëdes argenteus* Poirlet.

A. A.

MARTINI (E.). **Mückenplage in der Marsch, Chaetotaxis der Culicidenlarven und anderes.** [The Mosquito Plague in the Marsh Districts, Chaetotaxy of Culicid Larvae, and other Notes. — *Arch. f. Schiffs- u. Trop.-Hyg.* 1920. Vol. 24. No. 11. pp. 337-340.

An interesting, chatty discourse. Among other things the author insists that the specific differentiation of Anopheles larvae is literally a hair-splitting process—not the number of hairs but their grouping. With the chaetotaxy of the larva the physiological attributes of the adult are correlated; the slightest morphological detail may have epidemiological significance. The author's speculations, if not very original in quality, are interesting.

A. A.

BOYD (J. E. M.). **The Value of Small Fish Regarding the Destruction of Mosquito Larvae.**—*Jl. Roy. Army Med. Corps.* 1920. Nov. Vol. 35. No. 5. pp. 406-409.

The stomach-contents of 30 individual ten-spined sticklebacks examined by the author were found to consist largely of Entomostacra Crustacea of different kinds, and in 24 cases Anopheles larvae were also discovered—in one case as many as seven, in another case six.

The author therefore confirms the general belief that small fish, particularly those that feed at the surface, are one of nature's checks upon Anopheles. He furthermore infers that in dykes cleared of weed these small fish would be a useful adjunct to the sanitarian.

A. A.

SOUTHWELL (T.). **Fish and Mosquito Larvae in Bengal, Bihar and Orissa, India.**—*Ann. Trop. Med. & Parasit.* 1920. Nov. 27. Vol. 14. No. 2. pp. 181–186.

- The author in admirable philosophic vein ruminates on the impressions of eight years as Director of Fisheries in Bengal. His "words, like Nature, half reveal and half conceal the truth within" him; but though he has no doubt that, in Nature, certain fishes do exercise a check upon mosquitoes, he concludes that so far as the special requirements of man are concerned the effect is negligible.

A. A.

VICKERY (Robert K.). **Petroleum Insecticides.**—*Jl. Economic Entom.* 1920. Dec. Vol. 13. No. 6. pp. 444–447.

The refrain of this paper is that, since such enormous quantities of petroleum are now used in the destruction of insect pests as to entrench seriously on the natural resources, the chemistry and the exact physiological action of petroleum require to be studied with the object of economising the use of the oil as an insecticide.

A. A.

HEHIR (Patrick). **Mosquito-Nets: Their Use in the Past.**—*Lancet.* 1921. Mar. 12. pp. 529–530.

In correcting an erroneous text-book statement that mosquito-nets were first used in India in 1881, the author quotes an actual record of their use by Europeans in India at least as early as 1828. He continues with some discursive remarks on the subject of protection from mosquito bites, not omitting the well-known passage in the second book of Herodotus; and he concludes by recommending mosquito-proof wire-gauze for houses in preference to mosquito-nets in places where malaria is endemic.

A. A.

i. MANSION (J.). **Une nouvelle station de Phlébotomes en France.**—*Bull. Soc. Path. Exot.* 1920. Nov. 10. Vol. 13. No. 9. pp. 735–738.

ii. PRINGAULT (E.). **Les Phlébotomes dans la région Marseillaise.**—*Ibid.* Dec. 8. No. 10. pp. 809–810.

iii. PARROT (A.). **A propos de l'identification des Phlébotomes de France.**—*Ibid.* 1921. Jan. 12. Vol. 14. No. 1. pp. 21–22.

i. AUBERT captured *Phlebotomus* at Saint-Cyr to the north-west of Lyons in July 1911, and the author in August 1920 caught active females of *P. papatasi* at Bron village to the south-east of Lyons. ROUBAUD mentioned having caught *Phlebotomus*, not *papatasi*, at Clermont Ferrand (lat. about $45\frac{1}{2}^{\circ}$ N.).

ii. Record of the summer-autumn occurrence of *Phlebotomus* near Marseilles, namely, *P. minutus*, *P. sergenti*, and *P. perniciosus*, the last being the most abundant.

iii. With reference to MANSION'S identification of *Phlebotomus papatasi* in the Rhône department (see above), the present author considers that it has been confused with *P. perniciosus*, and points out that this species had already been recorded from the maritime Alps by LARROUSSE.

A. A.

FRANÇA (Carlos). **Notes de Zoologie Médicale. Observations sur le genre *Phlebotomus*.**—Reprinted from *Broteria* (Serie Zoologica). 1919. Vol. 17. Nos. 2 & 3. 59 pp. With 38 text figs.

The genus *Phlebotomus* is here treated in comprehensive and very precise entomological detail.

A. A.

LUTZ (Adolpho). **Dipteros da familia Blepharoceridae, observados no Brazil. Blepharoceriden aus Brasilien.**—*Mem. Inst. Oswaldo Cruz*. 1920. Vol. 12. No. 1. [Portuguese version.] pp. 21-43. Plates 1-7. [German translation. pp. 16-40.]

The author, after a general introduction to the family, describes 16 new species.

A. A.

PATTON (W. S.). **Some Notes on the Arthropods of Medical and Veterinary Importance in Mesopotamia, and on their Relation to Disease. Part 1. The Gad Flies of Mesopotamia. Part 2. Mesopotamian House Flies and their Allies. Part 3. The Bot Flies of Mesopotamia.**—*Indian Jl. Med. Res.* 1920. Apr. Vol. 7. No. 4. pp. 735-750. With 1 plate and 2 text figs. pp. 751-777. With 4 plates and 6 text figs. *Ibid.* July. Vol. 8. No. 1. pp. 1-16. With 2 plates and 2 text figs.

A most interesting paper from every point of view, the contents of which, however, can be merely indicated.

Part 1. The gad-flies observed represent eight species, namely, *Tabanus pulchellus*, Lw., *T. glaber*, Bigot, *T. polygonus*, Walker, *T. pulverifer*, Walker, *T. persis*, Ricardo, *T. sufis*, Jaennicke, *Chrysops punctifera*, Lw., and a *Haematopota* of which only two individuals were noticed. The author describes these species, and gives useful and discriminative accounts of most of them; only the first three were abundant, the two first-named being the pests.

During the campaign more than a thousand camels died of trypanosomiasis. A local sheikh interrogated by the author knew the disease well, knew that it had some connexion with the bites of gad-flies, and knew also how to protect his camels by keeping them far from the fly-haunted watering stations until dusk, when the flies had gone to roost. In a camp of sick camels the author found that all the specimens of *T. glaber* examined were infected with a species of *Crithidia*, the infestation of the rectum being particularly thick in many instances. He noticed that in the act of feeding the flies evacuated a dark fluid, and sometimes pure blood, which stuck to the skin and hair of the victim, that the evacuated fluid contained plenty of the said flagellates (and also of the post-flagellate stage), and that the victims licked their

bites; and he hazards the suggestion that the trypanosomes of the camel are derived from the Crithidia of the gad-fly, the infection passing to the camel through the mucous membrane of the mouth and lips in this licking. He did not, however, get an opportunity of testing this hypothesis.

Part 2. Three species of *Musca* (*M. determinata*, Walker, *M. humilis*, Wied., and *M. mesopotamiensis*, nov.) are described taxonomically and bionomically, and two more (*M. tempestiva*, Fallen, and *M. vitripennis*, Meigen) are briefly characterized. *Musca humilis* is, according to the author, probably a more widely distributed species in the East than *M. domestica*. *M. determinata* is also common. *M. mesopotamiensis* feeds on blood.

The account of the methods adopted for controlling house-flies is particularly full and interesting. To be brief, everything—animal droppings, latrine stuff, offal and slaughter-house garbage, food refuse, including tins, &c.—was thoroughly burnt in closed incinerators, the horse-dung first being thinly spread and quickly dried in the sun to form the staple fuel. In the season unfavourable for drying, the horse-dung, before being finally burnt, was first employed for some days to destroy maggots by its own spontaneous heat of fermentation. For this purpose it was piled on hard ground in enormous mounds 20 to 25 feet high and 30 to 40 feet in circumference, each mound representing two days' collection, and the collections of subsequent days were buried in the fermenting mounds successively. Here, however, it was found that flies would still oviposit on the surface of the mounds, and this necessitated the circumvallation of the mound with a shallow trench for trapping the resulting maggots. In pursuing this "biological" method the concurrent use of antiseptics and larvicides is forbidden, as they only impede the fermentation and so defeat the object intended. At every collecting depot a rough shelter was constructed to attract flies bent on the business of reproduction, or flies that had escaped the toils spread for them in the larval stage. These shelters were purged every night by men with torches of flaring kerosene.

For flies in the camp the author recommends a trap [figured in *Sanitation Supplement*, 1921, No. 2, p. 113] which is a modified meat-safe on legs. The bait for the trap [which seems rather to disregard the sensibilities of the soldier already tired by war's alarms] is the contents of the stomach and intestines of fresh-killed animals, smeared with blood-clot—a bait particularly attractive to flies wanting to deposit their eggs; and the entry-cones should be placed near the level of the bait, but not in the door of the bait-chamber.

Other Muscidae observed by the author were *Philaematomyia crassirostris*, Stein (= *insignis*, Austen), *Stomoxys calcitrans*, which was a great pest, *Lyperosia exigua* and *minuta*, *Calliphora erythrocephala*, *Pycnosoma albiceps*, *Lucilia sericata*, *Sarcophaga haemorrhoidalis*, and *Wohlfahrtia meigeni*. The author has useful observations on all.

Part 3. The species of bot flies observed by the author are a variety of *Gastrophilus intestinalis* and *G. nasalis* in horses and mules, *Cephalopsis titillator* in camels, and *Oestrus ovis* in sheep. The author describes them all, and deals with their several life-histories; the last two species certainly, and the first two probably, have two broods a year in Mesopotamia.

The three sections of the paper are most beautifully illustrated by Mrs. PATTON.

JOHNSTON (T. H.) & BANCROFT (M. J.). **Notes on the Biology of some Queensland Flies.**—*Mem. Queensland Mus.*, Brisbane. 1920. June 30. Vol. 7. Pt. 1. pp. 31-43. With 48 figs. [Summarized in *Rev. Applied Entom.* 1920. Nov. Vol. 8. Ser. B. Pt. 11. p. 189.]

Deals with numerous species of Muscoid flies, both Calyptrate and Acalyptrate, including the Flagellate and Nematode parasites of some of them.

A. A.

BEZZI (M.). *Musca inferior*, Stein: **Type of a New Genus of Philaematomyine Flies (Diptera).**—*Ann. Trop. Med. & Parasit.* 1921. Feb. 8. Vol. 14. No. 3. pp. 333-340.

Musca inferior was originally described by P. STEIN in 1909 from Java. Subsequently the same fly was described by PATTON and CRAGG under the name *Philaematomyia gurnei* from India. Still later the present author established the synonymy of these two, and he now proposes to separate the species as a distinct genus under the name *Ptilolepis*, differing from all known genera or subgenera of its group in having the lower squama of the calypters hairy on its upper surface: type *Ptilolepis inferior* (Stein).

A. A.

KUBO (Kametarō). [**Common Species of Flies in Houses of Manchuria.**]—*Tokyo Iji Shinshi (Tokyo Med. News)*. 1920. June 5. No. 2180. pp. 1085-1087.

The following flies were collected during September and October in cookshops and food-shops in the town of Eikō, Manchuria:—*Musca domestica* (8,437), *Muscina stabulans* (6), *Fannia canicularis* (11), *F. scalaris* (1), *Lucilia caesar* (13), *Calliphora lata* (2), *C. erythrocephala* (2), *Sarcophaga carnaria* (1). Thus *Musca domestica* formed 98.58 per cent. of the total number. This agrees with the result obtained by HEWITT.

Hiroshi Ohshima.

SWYNNERTON (C. F. M.). **An Examination of the Tsetse Problem in North Mossurise, Portuguese East Africa.**—*Bull. Entom. Res.* 1921. Mar. Vol. 11. Pt. 4. pp. 315-385. With 9 plates and 1 map.

This is one of the most interesting and most significant papers that has ever appeared on the tsetse-fly problem, which the author approaches from many sides and with an open, observing eye, being convinced that he is dealing with a broad oecological proposition requiring, among other things, the foremost co-operation of the forest botanist and no small assistance from the field geologist.

The country surveyed lies between the Buzi and Lusitu rivers, roundabout lat. 20° S. and long. 33° E., and the flies found in it are *morsitans*, *pallidipes*, *brevipalpis*, and *austeni*. The author relates that in Zulu times a fly-belt in this area was the stage of a fine experiment deliberate in practical aim, but unwitting in method—in the expulsion of fly. A chief, being determined to keep cattle despite the fly, deported the entire population into the fly-belt, with the result that in a broad belt of country the bush was displaced by cultivation

and cattle thrived not only in it, but also in much of the chiefly deciduous bush behind it. Large mammals certainly became very scarce in the cultivated belt—and to this the natives attributed the disappearance of the fly, which made cattle-farming possible—but not in the bush behind it, where, indeed, a later chief decreed that game should be allowed to multiply. The author's explanation is that the settled and cultivated belt not only became untenable by the fly, but also formed a barrier against their passage into the deciduous bush behind it; and on this he formulates a generalization that settlement, properly planned, is capable of clearing a country, at any rate of *brevipalpis* and *pallidipes*. It is mentioned that when, afterwards, the settled tract became depopulated and relapsed into bush the fly recovered its old wet-season limit.

As regards his own work the author, observing that each species of fly is dependent on a certain kind of shade, begins by analysing the character of the local woods and forests and classifying them according to their natural features and also by their combustibility, since next to well-planned settlement he regards burning of bush and undergrowth as one of the most effective methods of attack on fly. *Brachystegia* woodland mixed with *Uapaca* and *Diplorhynchus mossambicensis*, the latter of "weeping" habit and creviced bark, is tsetse-bush *par excellence*, retaining its leaf sufficiently to carry even the forest fly (*brevipalpis*) throughout the year. He also goes into the factors that influence the fall of the leaf in deciduous forest, since this affects the quality of shade and also bears upon the choice of time for burning. Geological features and formations as affecting the nature and distribution of bush and forest are also analysed with insight.

After dealing in considerable detail with the various types of forest and the specific composition and natural features and sites of each type, the author records a great mass of observation on the fly itself. He refers more than once to its "tick-like habits," its small propensity to aimless wandering, which is as well marked as its tendency to travel *with game*, etc.; twice was his party (which included cattle) followed more than six miles. He does not seem to believe much in any "migration," apart from the accompanying of game in its movements. He thinks that, within limits, "homing" occurs after game has been followed away from shade, but is not satisfied that a "homing" fly would not be content with any suitable shade that offered.

As regards food, bush-pig and baboons are probably as useful to the fly as big game, and there is some suspicion than cane-rats might be utilized, being largely diurnal. *Morsitans* and *pallidipes*, both of which will attack up to nightfall and will come to light—even to firelight—for a bite, prefer cattle to man; *morsitans* is more disposed than *pallidipes* to attack man, and both are more so disposed than *brevipalpis*; this last species attacks at any hour in the shade, but does not attack away from its thickets except in the early morning, or after sunset, or on dull rainy days; it also will come to lights. The goat, and even the sheep, is not liked by fly. It is reasonable to believe that man would be more attacked if game were destroyed.

As regards proportion of sexes, the author confirms those observers who do not find any evidence of disproportion. If cattle were used for bait by the collector, an equal number of both sexes would be taken; the preponderance of males captured under certain circumstances is explained by their greater sexual ardour and restlessness.

As regards breeding-habits: in the case of *morsitans* some evidence of localized breeding-centres was noticed, perhaps more particularly in the concentrations of that species at the period of leaf-fall.

Many other observations are recorded, and natural enemies of course are not ignored.

In dealing with tsetse-control in general the author discusses in the light of his own experience various methods that have been suggested.

Regarding game destruction: in clean forest without undergrowth, if also bush-pig were not abundant, it is conceivable that wholesale destruction of game might for a time banish the fly; but if bush-pig, baboons, and perhaps other smaller mammals, were numerous it would not be possible to starve the fly merely by destroying the game. Game destruction, however, might be trusted to check the extension of a fly-belt, since apart from their association with moving game fly do not travel much.

The author himself appears to think highly of depriving the fly of its necessary shade, by some method of *clearing*. If by cutting, then cutting must be followed by annual late burning; otherwise the cleared area very soon reverts to coppice growth, which in an open tract would be particularly attractive to *pallidipes*, and under high overgrowth to *brevipalpis*. Or clearing might be done by poisoning with arsenite, followed by a course of late fires. Judicious native settlement, as in the native experiment above described, has much to recommend it. Of all methods of clearing the author prefers well regulated annual burning; if the burning is done too early in the season the undergrowth soon recovers and becomes even denser than before; the burning must, therefore, be done late, when everything is dry; combustion is then more complete and its effects more lasting. The author discusses the objections to burning—possible drying of springs, destruction of valuable items of timber, coarsening of pasture—but he makes annual late burning, with a very infrequent intermission of one year, the outstanding recommendation of his report, the measure to be continued over a considerable term of years. The area selected for the experiment should be carefully charted, described, photographed, and periodically examined.

Morsitans might also be attacked at its concentration spots, by clearing bush and planting the heavy forest avoided by this species; by poisoning or gassing the clusters of males and the adjacent bush; by catching or spraying, using cattle for bait, though it is doubtful that cattle would stand such exposure to tsetse long; or by the construction of artificial breeding-places.

Rendering protection to natural enemies is also mentioned, with the qualification that it would be impossible to make protective edicts effective in practice.

A. A.

TRANSACTIONS OF THE ROYAL SOCIETY OF TROPICAL MEDICINE & HYGIENE, 1920. NOV. 19. Vol. 14. No. 4. pp. 59-62.

Report of Glossina Sub-Committee."

This is the programme of a project for an oecological survey of the notorious tsetse-flies and cannot be further condensed.

A. A.

PATTON (W. S.). **Some Notes on Indian Calliphorinae. Part I. *Chrysomyia bezziana*, Villeneuve, the Common Indian Calliphorine whose Larvae cause Cutaneous Myiasis in Man and Animals.**—*Indian Jl. Med. Res.* 1920. July. Vol. 8. No. 1. pp. 17–29. With 1 coloured plate.

The author draws attention to a paper by TOWNSEND [see this *Bulletin*, Vol. 8, p. 382], where it is explained that the generic name *Chrysomyia*, sometimes applied to the American screw-worm fly, belongs by rightful precedence to the old-world species sometime known as *Pycnosoma*; that these latter species therefore must henceforth be called *Chrysomyia*; and that the American species must be called by a new generic name *Cochliomyia*.

Chrysomyia bezziana is here described in all its stages, and in its habits. The author argues, from the facts that he has not been able to attract the fly to deposit its eggs in dead animals, or to rear first and second stage larvae in decomposing carcasses, and that the larval spines are recurved to ensure fixation in living bodies, that the fly deposits its eggs *only* in living animals. At any rate it is a common parasite in wounds, ulcers, etc., in India, and the author specifies 24 cases of its occurrence in man and 16 in domestic animals. The paper is beautifully illustrated by Mrs Patton.

A. A.

WRIGHT (R. L.) & PATTON (W. S.). **A Case of Myiasis of the Frontal and Ethmoidal Sinuses and the Orbit.**—*Indian Med. Gaz.* 1921. Feb. Vol. 56 No. 2. pp. 58–59. With 1 text fig.

In this case, a Hindu female, aged 30, the whole of the left brow was converted into a foul-smelling gutter—full of slough and muco-pus and alive with maggots—the depths of which opened into the frontal sinuses, ethmoid cells, nasal fossae and apex of the right orbit. There was much destruction of bone in the vicinity, but the dura mater was not exposed; both eyeballs were pushed outwards, the corneae were covered by the oedematous eyelids, and there was a large ulcer in the left cornea. The patient was very weak, with a feeble pulse and a subnormal temperature. The stinking cavity was cleaned of slough, etc., cleared of 50 maggots, irrigated with KMnO_4 solution and with applications of turpentine, and afterwards kept loosely packed with iodoform gauze and frequently irrigated with chlorine solution. Next morning 30 more maggots were removed. It was found that the upper and right margins of the ulcer consisted of a gummatous mass.

The patient is reported as doing well, and hopes are entertained that the right eye at least may be saved for useful vision, as the muscles of the eyeball were not destroyed. The maggots are identified as *Chrysomyia bezziana*.

A. A.

MAGATH (Thomas Byrd). ***Dermatobia hominis*.**—*Arch. Dermat. & Syph.* 1920. Dec. Vol. 2. No. 6. pp. 716–721. With 4 text figs.

A summary of some previously recorded cases, with a description and figures of the parasite, the object of the paper being to anticipate the possible spread of *Dermatobia* beyond its present area.

A. A.

FÜLLEBORN (F.). **Ueber Ophthalmomyiasis und einen solchen Fall aus Nord-Frankreich.** [Ocular Myiasis and Notes on a Case from Northern France.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1919. Vol. 23. No. 16. pp. 349-359. With 3 text figs.

The author concludes that though *Oestrus ovis* and Sarcophagids may sometimes be responsible, the most frequent cause of ophthalmomyiasis in man is *Rhinocestrus*. The paper includes a useful list of references to the subject.

A. A.

TAKEDA (Saburo). [**A Case of Myiasis.**—*Tokyo Iji Shinshi (Tokyo Med. News)*. 1920. Aug. 14. No. 2190. pp. 1531-1535.]

A case of myiasis intestinalis is reported from Seoul, Korea. The patient, a 52-year-old man, had been suffering from ankylostomiasis. Besides the symptoms characteristic of that disease, some unusual pain was felt at the lower part of the abdomen. As a result of the use of anthelminthics 11 maggots were obtained, together with 61 individuals of *Ankylostoma*. The peculiar pain in the abdomen ceased soon after the maggots had been discharged.

These maggots were identified as *Muscina stabulans*, being nearly full-grown larvae, and measured 11.5-15.1 mm. in length.

Hiroshi Oh-shima.

FUJITA (Takeshi). [**A Case of Myiasis.**—*Jika Zasshi (Jl. of Pediatrics)*. 1920 May 20 No. 240. pp. 45-49. With 1 plate.]

More than 300 young dipterous-larvae, along with some *Ankylostoma*, were obtained by purgation from a five-year-old girl who had been suffering for several months from anaemia. Recovery ultimately followed. The author conjectures that the larvae were *Lucilia*, but they were not reared.

H. O.

i. CLARKE (J. Tertius). **Tropical Fleas.** [Correspondence.—*Brit. Med. Jl.* 1920. Dec. 11. p. 921.]

ii. BALFOUR (Andrew). **Tropical Fleas.** [Correspondence.—*Ibid.* Dec. 18. p. 954.]

i. The author is not satisfied with the statement that *Pulex irritans* is a cosmopolitan species. [If readers of the *Bulletin* would send specimens of the fleas found by them on man to the Bureau this question could be settled decisively.]

ii. A note with reference to CLARKE's letter stating, with due reserve, that *Pulex irritans* is not known in the Anglo-Egyptian Sudan.

A. A.

CRAGG (F. W.). **Further Observations on the Reproductive System of Cimex, with Special Reference to the Behaviour of the Spermatozoa.**—*Indian Jl. Med. Res.* 1920. July. Vol. 8. No. 1. pp. 32-79. With 4 text figs. and 8 plates.

This paper, which describes a careful piece of work and is intrinsically of extraordinary interest, is so exceedingly and so widely suggestive as to claim attention in every medical journal, notwithstanding the fact that its title does not imply any particular connexion

with medicine. It describes in great detail, but in the clearest and most readable style, the spermatozoa of the bug, the organ of Berlese of the female bug, which receives the spermatozoa at the act of copulation, the organ of Ribaga which serves as a portal to the organ of Berlese, and the anatomy and histology of the female reproductive tract, and it gives in similar detail an account of the extraordinary course taken by the spermatozoa in their passage to the egg.

In an interesting introduction, which also contains a review of previous work on the subject and a description of the author's technique, the imperfection of our knowledge of the mechanism of fertilization—not only in insects, but also in higher animals—is discussed, and the author here refers, with full appreciation of its varied suggestiveness, to a paper by J. H. F. KOHLBRÜGGE, entitled “Die Verbreitung der Spermatozoiden im weiblichen Körper und im befruchteten Ei.” The observations recorded in this paper, which is published in the *Arch. f. Entwicklungs-mechanik der Organismen*, 1912, Vol. 35, No. 2, p. 165, show that in bats, rabbits, mice, fowls and shark the spermatozoa actually penetrate between and into the cells of the mucous membrane of the genital tract; that in some animals they penetrate into already fertilized and developing eggs, and that in the fowls observed they do not pass much beyond that part of the oviduct where the egg-shell is formed. The author particularly notices the pathological vista opened out by the discovery that the spermatozoa penetrate body-cells of the female.

It is not possible to condense the voluminous histological detail; but the following is a brief chronicle of the extraordinary migrations of the spermatozoa. In pairing, the male organ is placed in a cleft in the right half of the posterior border of the fourth abdominal sternum of the female, and the spermatozoa pass into the neighbouring organ of Ribaga, through which they rapidly filter into the organ of Berlese. This latter organ has no duct, and the spermatozoa, in some way still undetermined, pass through its walls in bundles into the body-cavity, beginning their passage in about four hours after the act of pairing. In the body-cavity they pass back into the oviduct and spermathecae, round which they accumulate, and then make their way through the wall into the spermathecae. From the spermathecae they do not travel up the lumen of the common oviduct, but they make their way in the substance of its wall and the walls of the lateral oviduct into the solid lobules of the ovary.

The author has not traced the actual fertilization of the ovum, but the phenomenon to which he draws attention is of another kind, namely, that the great majority of the spermatozoa, though they reach the oviduct, are not destined to fertilize ova at all, but are absorbed or are unified in some way with the metabolism of the ovary. “The enormous mass of protoplasm received by the female during successive acts of copulation, in the form of spermatozoa, leads one to doubt whether the latter have not some function other than that of the fertilization of the eggs.” The author finally discusses the significance of these events, which were first noticed, though not accurately followed by BERLESE. BERLESE thought that some of the superfluous spermatozoa reached the organ named after him from the spermathecae by way of the body-cavity, and were digested in that organ, and that others of them were absorbed by the epithelium of the ovary; and he considers that the function of the superfluous spermatozoa was partly to nourish the female during the period of oviposition, and partly to stimulate the development of her reproductive organs.

[In some viviparous Embiotocid fishes superfluous spermatozoa are utilized for the nourishment of the embryos, just as in some viviparous Ophidiid fishes superfluous ova are used for the same purpose.]

A. A.

LAVERAN (A.) & FRANCHINI (G.). **Contribution à l'étude des insectes propagateurs de la flagellose des Euphorbes.**—*Bull. Soc. Path. Exot.* 1921. Mar. 9. Vol. 14. No. 3. pp. 148-151.

The authors notice the previous records on this subject and enumerate the Hemiptera caught by them feeding on infected Euphorbias at Bologna. In smears of the gut of 100 Hemiptera examined flagellates were found in two individuals of two different species of Nysius, and Leishmaniform bodies in two individuals of two different species of "Cimicidae"—namely *Calocoris chenopodii* and *Megalocacrea ruficornis*.

In one Lygeid bug (probably a Nysius) a multitude of Spirochaetes was found.

A. A.

BEVEN (J. O.). **"Acidosis" following Bee-Stings.** *Lancet.* 1920. Oct. 23. p. 850.

Three Europeans in Ceylon, a medical man and two ladies, were attacked by swarms of the Indian rock-bee (*Apis dorsata*). Two hours afterwards, having in the meantime removed some of the stings, taken and also applied some whisky, and undergone a motor journey of 15 miles, they were seen by the author.

The male patient, who had received about 120 stings, was then in a state of collapse, with abdominal cramp, incessant greenish-yellow vomiting, and profuse rice-water diarrhoea. After persistent treatment for three-quarters of an hour with sodium bicarbonate and brandy he was somewhat relieved, and within a few hours he had recovered. About a week later, however, he developed a dermatitis similar to that to be described below.

The first lady patient, who had been stung in over 80 places but was only feeling sick, did not collapse until about three-quarters of an hour after being seen, when she became cold, clammy, and almost pulseless. Vomiting was continuous, but there was not diarrhoea and only slight cramp. After an hour's persistent treatment with sodium bicarbonate, brandy, and hot bottles, this almost desperate condition was relieved, and recovery was complete within a few hours. Next day there was ecchymosis around the sting-wounds, but no swelling.

The second lady patient, who had been stung only slightly, did not suffer acutely at the time, but about a week afterwards she developed a general erythema with patches of urticaria and the most intense pruritus. The rash disappeared in about five days, but was then succeeded, particularly in the areas most stung, by hard indolent furuncles that lasted for some weeks.

A. A.

PRINGAULT (E.) & VIGNE (P.). **Sur quelques cas de parasitisme par *Rhipicephalus sanguineus*, Latreille, 1806.**—*Bull. Soc. Path. Exot.* 1921. Feb. 9. Vol. 14. No. 2. pp. 91-93.

The symptom in these cases was an intense itching not due to any portion of the tick being left in the skin, and therefore probably due to the creature's venomous saliva.

A. A.

PUNTONI (Lino). **Epidemia di acariasi del grano (da *Pediculoides ventricosus*).**—*Polichinico. Sez. Prat.* 1920. Nov. 8. Vol. 27. No. 45. pp. 1273-1275.

The author describes an epidemic of acarioris due to the Tarsonemid mite, *Pediculoides ventricosus*, occurring in the province of Pisa in September-October. The eruption, which was strongly pruriginous, appeared to be erythematopapulous, but was really erythematovesiculous; in some cases it was confluent and oedematous. In bad cases the temperature might rise to 40° C. According to the author the mite does not multiply on man, nor was any instance of contagion from man to man observed.

A. A.

PANTALEONI (Pio). **Vasta epidemia di acariasi da grano in Romagna.**—*Polichinico. Sez. Prat.* 1920. Nov. 8. Vol. 27. No. 45. p. 1275.

An epidemic of "extraordinarily pruriginous" dermatitis due to *Pediculoides ventricosus*, occurred in the month of September in the provinces of Forlì and Ravenna. The first cases were diagnosed as some kind of infective fever. The eruption—papulous or papulovesiculous—may spread over the whole body, and the temperature in some cases may rise to 39°-40° C.

A. A.

NOC (F.) & CURASSON (G.). **Contribution à l'étude de l'évolution biologique de *Porocephalus armillatus*, Wyman.**—*Bull. Soc. Path. Exot.* 1920. Oct. 13. Vol. 13. No. 8. pp. 656-659.

Fat of a *Python sebae* containing eggs of *Porocephalus armillatus* was ingested by a *Cercopithecus patas* and two guinea-pigs. In the latter, killed 2 and 8 months afterwards, no larvae were found. The *Cercopithecus* died 86 days afterwards and all its thoracic-abdominal viscera were literally stuffed with larvae, many also being found in the blood. Some of these larvae were ingested by a *Python sebae* and some by a sheep. No further development has occurred in the sheep, but in the *Python* the larvae were recognized mostly as adults 106 days afterwards. Coupling of the parasites was observed. Eggs and embryos were also found embedded in the cellular tissue of the body-cavity and in the walls of the intestine of the *Python* experimentally infected.

The authors have not seen the egg of *Porocephalus* in the bronchial mucus; but they have assured themselves that four guinea-pigs bred in the laboratory must have become infected with larvae of *Porocephalus* from contaminated herbage.

Larvae of *Porocephalus* have been discovered in Primates, Carnivora, Insectivora, Ruminants, and Rodents.

A. A.

WOODLAND (W. N. F.). **On a Remarkable New Species of *Porocephalus* (*P. pomeroi*, sp. n.) from the Fore-Gut of a Nigerian Cobra.**—*Parasitology*. 1920. Dec. Vol. 12. No. 4. pp. 337–340. With 1-text fig.

A *Porocephalus* of remarkable shape. The head is abruptly separated from the rest of the body by a long and slender neck, behind which are 32 annuli, the first of which is of pre-eminent size. The specimen described is a female. A male said by the finder to have been paired with it has no peculiarity of shape and is treated with a query. [The possibility of the remarkable female being an individual abnormality is worthy of consideration.]

A. A.

NATTAN-LARRIER. *Porocephalus armillatus*. **Présentation.**—*Bull. Soc. Path. Exot.* 1920. Oct. 13. Vol. 13. No. 8. p. 659.

The author exhibited drawings of sections of liver of wart-hog (*Phacochoerus*) showing infection with *Porocephalus armillatus*.

A. A.

CATAN (A.). **Adsorption du venin de Cobra par le charbon.**—*C. R. Soc. Biol.* 1921. Jan. 22. Vol. 84. No. 3. pp. 168–169.

The adsorption of the haemolysin of cobra venom by animal charcoal is not regular and does not follow FREUNDLICH'S formula: in graded concentrations of venom it increases up to a certain point, and then decreases directly with the increased concentration independently of temperature, above or below 45°C. The author thinks it a reasonable inference that the haemolysin has an affinity for charcoal and also for the non-haemolytic substances of the venom.

A. A.

CATAN (A.). **Adsorption des venins de *Lachesis* par le charbon. Constitution complexe de l'hémolysine.**—*C. R. Soc. Biol.* 1921. Jan. 22. Vol. 84. No. 3. pp. 170–171.

Animal charcoal completely adsorbs the haemolysin of the venom of *Lachesis alternatus* (without depriving the venom of toxic power entirely), but not that of the more strongly haemolytic venom of *L. niuswedii*. The author is of the opinion that the haemolysin is a compound of two substances, of which one is fixed by animal charcoal, is not of itself haemolytic, and does not neutralize antilytic serum, while the other, though also not of itself haemolytic, is not fixed by animal charcoal, and neutralizes the antilytic property of serum.

A. A.

AQUINO (L.-I.). **Action des venins de serpents sur la résistance globale.**—*C. R. Soc. Biol.* 1920. Dec. 4. Vol. 83. No. 35. pp. 1531–1532.

Investigating the general effect of snake-venoms on globular resistance, the author concludes that the coagulant venoms, besides causing an immediate increase of the intraglobular resistance, also have an ulterior protective effect on the resistance. This effect, he thinks, is due to an actual deposit of fibrin, acting as a sort of protective varnish on the red corpuscles.

A. A.

GUNN (J. A.) & HEATHCOTE (R. St. A.). **Cellular Immunity : Observations on Natural and Acquired Immunity to Cobra Venom.**—*Proc. Roy. Soc.* 1921. Feb. Ser. B. Vol. 92. No. B.643. pp. 81–101. With 8 text figs.

In their introductory statement the authors remark that little of the now vast literature on immunity has concerned itself with the cellular as compared with the humoral phenomena—that accurate information respecting the part played by living cells other than the blood cells in the acquisition and retention of immunity is still wanting. In reviewing the present state of knowledge bearing on cellular immunity the senior author analyses a series of recorded observations which show that, alike with eel-serum, cobra-venom, and strophanthus, no consistent relation, if any correlation at all, was found to exist between *natural* immunity of the animal and the resistance of its erythrocytes to haemolysis; while, on the other hand, in the case of strophanthus the existence of a quantitative relation between natural immunity of the animal and resistance of the heart was clearly demonstrable, but as regards *acquired* immunity the recorded observations are few and inconclusive.

In their own experimental observations here recorded in detail the authors show that the *natural* immunity of the cat to cobra-venom must in part be due to a cellular immunity of the animal's tissues; for—the minimum lethal dose for the cat being twenty times that for the rabbit—it was found that with hearts excised and freed from serum it required four times as strong a solution of venom to arrest that of the cat as to arrest that of the rabbit, and also that the isolated intestine of the cat tolerated a higher strength of venom than that of the rabbit; though the erythrocytes of the cat were more sensitive than those of the rabbit to the haemolytic action of the venom.

As regards *acquired* immunity also the present experiments with cobra-venom show that at any rate the heart and intestine acquired immunity independent of the antitoxin circulating in the serum; for those tissues, when freed from serum, withstood higher concentrations of venom in the case of the immunized than in the case of the normal rabbit; though the washed erythrocytes of the immunized rabbit were more sensitive than those of the normal rabbit to the haemolytic action of the venom.

The extent to which other tissues acquire immunity independent of the presence of antitoxin in the serum is a matter for investigation.

A. A.

MONSERRAT (C.), SCHÖBL (O.) & GUERRERO (L. F.). **Venom of the Philippine Cobra (Alupong) *Naja Naja Philippinensis*.**—*Philippine Jl. Sci.* 1920. July. Vol. 17. No. 1. pp. 59–64.

From experiments with guinea-pigs, rabbits, and monkeys, the authors conclude that the venom of this species is slightly more toxic and slightly less haemolytic than that of other species of *Naja*.

A. A.

CALMETTE (A.). **Sur quelques animaux destructeurs des serpents venimeux.**—*Bull. Soc. Path. Exot.* 1921. Jan. 12. Vol. 14. No. 1. pp. 3–5.

A good many animals are known to devour snakes. The author mentions the pig, which in the Western States of America feeds on young rattlesnakes, being protected against the venom not by any

antitoxic quality of its serum, but by its thick layer of subcutaneous fat; the mongoose, which is protected by its extraordinary agility; the hedgehog, whose blood contains substances antitoxic to viper venom; and *Eliomys*, a malodorous member of the dormouse family, whose blood also is said by BILLARD to be antitoxic to viper venom. He also mentions under their vernacular names some rapacious and cursorial South American birds, and above all quellers of snakes the famous *Mussurana* (*Oxyrhopus cloelia*) of Brazil, itself a large *Opisthoglyph* snake, which habitually devours venomous snakes, attacking those of the largest size, and being quite immune to crotaline venom, though not to the venom of *Elaps*. The author extols the benevolence of Mother Nature, who has provided the *Mussurana* for the protection of her children.

A. A.

ERRATUM.

Vol. 15. p. 149. BOYD summary (*Trichomonas*), last sentence. For "Attempts to infect two rats from the subcultures were not successful," read "One rat was successfully infected from a culture."

AMOEBIASIS AND DYSENTERY.

AMOEBIASIS.

MEDICAL RESEARCH COUNCIL. (Privy Council). Special Report Series, No. 59. **A Report on the Occurrence of Intestinal Protozoa in the Inhabitants of Britain, with Special Reference to *Entamoeba histolytica*.** [By DOBELL (Clifford), with Contributions by CAMPBELL (A. H.), GOODEY (T.), McLEAN (R. C.), NUTT (Muriel M.) & THACKER (A. G.).]—71 pp. 1921. London: Published by His Majesty's Stationery Office. [Price 2s. net.]

This report, which is a model of artistic finish, contains a lucid statement, and a critical summary, of the evidence relating to the prevalence of intestinal Protozoa in the inhabitants of Great Britain. This evidence, the more select part of which was elicited by SMITH and MATHEWS and other observers at Liverpool, and by various workers at Brighton, Bristol, Leeds, Sheffield and Reading, shows clearly that—quite apart from any fortuitous association with sequelae of the war—infections of *Entamoeba histolytica* and *coli*, *Endolimax nana*, *Iodamoeba butschlii*, *Dientamoeba fragilis*, *Giardia intestinalis*, *Chilomastix mesnili* and *Trichomonas hominis* are to be looked upon as indigenous to these islands; and, as regards the first of these, that, although it is commonly innocuous, it may as an indigenous parasite give issue to all the grave pathological consequences with which its name is more commonly associated in tropical countries.

The author begins with a review of the work that led the way to the new conceptions of the range and significance of *E. histolytica*, work showing, on the one hand, that infection with this parasite has no necessary pathological import, and, on the other hand, that amoebic dysentery has no necessary connexion with the tropics; and he follows this up with a most interesting chapter where records of old hospital cases, one of them dating as far back as 1862, are resuscitated to show that the latter proposition is not altogether novel. Here are recounted three cases—a woman of 37, a man of 36, and a girl of 3½ years—all stated to have been nurtured entirely in England, where extensive ulceration of the large intestine with concomitant abscess in the liver were found after death, and a fourth indigenous case where, in addition, amoebae were identified in pus taken from the liver. Any doubt of the possibility of such infection being acquired from indigenous sources is resolved by that section of the report dealing with the recent results of examination of faeces of more than 3,000 individuals, all of whom had lived all their life in Britain. Of this large number, over 1,000 of whom were young recruits in training for the Army, no less than 3·4 per cent. were found to be harbouring cysts of *E. histolytica*. Similar evidence of the occurrence of this infection is adduced from France, Holland and Germany.

That *Entamoeba histolytica* can and does commonly exist in the human bowel, both here and in the tropics, without any apparent ill-effects upon its host, must be regarded therefore as a well-established proposition. Why it should sometimes cause ulceration of the bowel and suppuration in the liver is still a question to be asked. The author's speculations on this last point are not so free from ambiguity as we should expect of him. In one place he appears to accept the view that the parasite must *always* erode the intestine of its host, and to leave it

to be implied that if the erosion is not made manifest by symptoms it is not pathological. In another place he seems to approve the notion of different races of the parasite adapted to the different races of man, and of a pathogenic discordance due to trespass by a race adapted to the bowel of one race of man into an alien bowel. In a third place, again, he speaks of the parasite as being harmful to certain abnormally susceptible individuals.

A. Alcock.

- (i) WOODCOCK (H. M.); (ii) PERKINS (Herbert). **Endemicity of Intestinal Protozoa.** [Correspondence.]—*Brit. Med. J.* 1921. Mar. 5. pp. 363-364: p. 364.

(i) As a possible explanation of the fact that infection with *Entamoeba histolytica* is in this country so rarely pathogenic, while it is so frequently the cause of amoebic dysentery in the tropics, the author suggests [as others have done] that in the latter case there may be some particular circumstances concomitant with the infection, or some predisposing influence, such as a bacterial infection, or some alteration of the intestinal flora, or perhaps some climatic factor, that lowers resistance to the amoeba.

(ii) In a series of examinations of 120 children in the Paddington Green Hospital, the author found *Lamblia intestinalis* in seven, the youngest of whom was only three months old.

A. A.

- BRUG (S. L.). **Onderzoek naar het voorkomen van dierlijke darmparasieten bij niet-buiklijders.** [Inquiry into the Occurrence of Intestinal Animal Parasites in Persons with no Abdominal Disease.]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1920. Vol. 60. No. 4. pp. 626-635.

This is a record of the results obtained by examining the stools of a number of persons displaying, at the time, no symptoms of intestinal disease. The investigation was conducted upon patients in the non-dysenteric wards of a military hospital [at Weltevreden, Java?]. Altogether 100 Europeans and 150 natives were studied. Of these 250 cases, 214 were soldiers. The protozoa and worm eggs discovered in their faeces are recorded in a table—the findings for each class (Europeans, natives, and soldiers) being given separately as percentages expressed as the nearest whole number.

The protozoological findings present few noteworthy features. All the usual species (*E. coli*, *E. histolytica*, *E. nana*, *Giardia*, *Chilomastix*, and *Trichomonas*) were encountered. The stools of each patient were examined on three different occasions, usually during the week after entry. *Entamoeba histolytica* is recorded as occurring in 21 per cent. of Europeans, 16 per cent. of natives, and 17·5 per cent. of soldiers; but these figures are evidently not complete. "*E. tenax*" [Brug's name for the strains of *E. histolytica* forming small cysts] is entered separately with respective percentages of 6, 8, and 7. Furthermore, we find an "*Entamoeba* sp." [not determined] recorded from no less than 10, 14, and 13 per cent. respectively, and "Amoebae (not more closely identified)" from 7, 1, and 4 per cent. The author calculates, however, that between 20 and 30 per cent. of the military patients were

probably infected with *E. histolytica*. [It is clearly impossible to ascertain the true incidence of infection from figures recorded in this way.]

A noteworthy feature in the findings is the high rate of infection with "*Endolimax williamsi*" [= *Iodamoeba bütschlii*], which was found in 12 per cent. of Europeans and 8 per cent. of natives.

In searching for worm eggs, the author examined two or more thick cover-glass films on each occasion. In addition to *Ascaris*, *Trichuris*, and Ankylostomes, he found *Oxyuris* (in one native), *Strongyloides stercoralis*, *Taenia saginata*, and *Hymenolepis nana* (in one European). The most noteworthy findings were those for *Trichuris*, which was found in 55 per cent. of Europeans and 79 per cent. of natives. [It is regrettable that the results of other workers—especially British—along the same lines are not mentioned, though at least one work in which some of them are recorded is quoted for another purpose.]

Clifford Dobell.

MANSON-BAHR (Philip) & GREGG (A. L.). **The Use of the Sigmoidoscope as an Aid to Diagnosis in Chronic Dysentery.**—*Trans. Roy. Soc. Trop Med & Hyg* 1921. Jan. 21. Vol. 14. No 5. pp. 88-91.
— & —. **The Diagnosis of Dysentery by the Sigmoidoscope.**—*Lancet*. 1921. May 28. pp. 1121-1125. With 7 figs.

The authors advocate and justify the routine use of the sigmoidoscope in the diagnosis of suspected dysentery; not, of course, in the acute stages, which can be correctly determined by laboratory methods, but in those chronic and intractable cases where the original infection, if there be any history of it, occurred several years back, and where, if it were bacillary, no information can be expected from faeces, from cultures, or even from serology; and if it were amoebic, the cysts, though repeatedly searched for, might by their inconstancy and irregularity elude detection.

By the sigmoidoscope a rapid and accurate diagnosis can be made by inspection of the mucosa; and not only can the exact nature of doubtful cases be determined, but also unsuspected non-dysenteric lesions and growths may be revealed.

The patient is prepared by emptying the large bowel, and the method preferred by the authors is an evening dose of half an ounce of castor oil, followed in the morning by a soap-and-water enema. Immediately after the enema a dose of 15 minims of *Tr. opii* is given to keep the bowel quiet. The patient is put in the lithotomy position. An anaesthetic is disadvantageous, as the operator desires guidance by the patient's sensations. Pain and discomfort, of course, vary with individual temperament. Pain should not be felt with a normal bowel; it is usually greater in bacillary than in amoebic cases; it does not seem to depend much on ulceration, since patients with extensive lesions sometimes make little or no complaint.

The distance to which the instrument can travel varies; in some cases a length of only a few inches, in others a length of 12 inches or so can be passed.

In amoebic cases the ulcers and the exact nature of the haemorrhages can be made out, and if desired the ulcers may be scraped with an extemporized blunt instrument introduced through the tube of the sigmoidoscope and the scrapings microscopically investigated.

In post-bacillary cases the authors have seen the plush-like appearance of the mucosa in slight affections, the hyperaemic granular or glazed

appearance in more advanced cases (Fig. 5), the masses of friable and vascular granulation-tissue overlying scars and necroses in still later stages (Fig. 6), and in the severest and most advanced stages vascular polypi sometimes as much as $\frac{3}{4}$ in. long (Fig. 7).

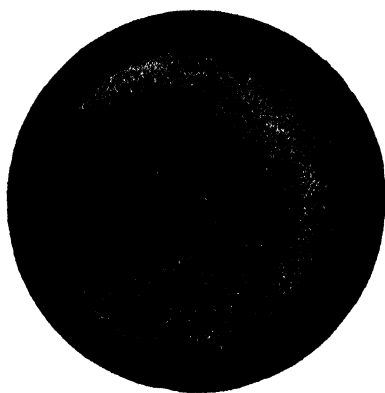


FIG. 5.—Chronic bacillary dysentery.—Grazed and granular appearance of mucosa due to formation of granulation tissues.



FIG. 6.—Chronic bacillary dysentery.—Deposition of granulation tissue and fibrosis.

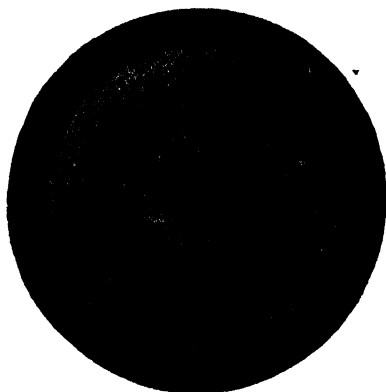


FIG. 7.—Chronic bacillary dysentery. — Showing large polypi (4 ins. from anus).

[Reproduced by permission from *The Lancet*, 1921, May 28.]

A detailed statistical table is given of 100 cases of suspected dysentery, in 58 per cent. of which a verified diagnosis was made by a single sigmoidoscopy, while in the same 100 cases repeated microscopical examinations gave about 30 per cent. of determinations.

A. A.

MENDELSON (R. W.). **Amebic Dysentery in Siam.**—*Jl. Amer. Med. Assoc.* 1921. Jan. 29. Vol. 76. No. 5. pp. 305–306.

During the last year the author examined 13,000 patients at the Central Hospital, Bangkok. Of these 367 complained of intestinal troubles, and 135 were diagnosed and treated for amoebic dysentery.

The author is a firm believer in emetine, and never uses rectal irrigations.

P. H. Manson-Bahr.

CHARPIN (E.). **L'amibiase chronique en France (étude clinique).**
Thèse de Paris. 1919. [LEGRAND (Amédée).] Analysé dans la
Gaz. des Hôpit. 1920. Dec. 7 & 9. Vol. 93. No. 103. p. 1651.
[Summarized in *Bull. Office Internat. d'Hyg. Publique.* 1921.
Feb. Vol. 13. No. 2. pp. 192–193]

Amoebiasis is quite frequently contracted in France. The author insists that 20 per cent. of the soldiers with gastro-intestinal disturbances examined during the war were carriers of entamoebae or their cysts; amongst Colonial troops the percentage was higher (25 per cent). The remainder of the paper is occupied by a clinical description of amoebic colitis and hepatitis on familiar lines.

P. H. M-B.

HILL (Athelstane). **Upward Displacement of the Diaphragm, with Special Reference to the Diagnosis of Amoebic Hepatitis.**—*Jl. Roy. Army Med. Corps* 1921. Mar. Vol. 36. No. 3. pp. 187–203.
With 5 text figs. and 8 charts.

In a previous paper (see this *Bulletin*, Vol. 15, pp. 186–187) the author, recently in charge of medical divisions of hospitals attached to the Salonika Force, emphasized the value of certain physical signs characteristic of amoebic and other forms of hepatitis. A record of additional 94 cases is now cited in support of these views. The signs were: Raised deep liver dullness, displacement of the heart upwards and to the left, certain areas of impairment in the lungs, especially of the right apex. The cases were as follows:—

X-ray evidence of displacement of the diaphragm	12
Liver abscess found	4
Subphrenic abscess	2
Secondary malignant growth in liver	1
<i>E. histolytica</i> or cysts found	31
Entamoebae present	2
Ulcers of large intestine found post mortem	1
Definite effect of emetine on signs and symptoms	30

83

Of the 11 remaining cases, in four the displacement of the diaphragm was caused by conditions other than hepatic, while in seven the signs were caused by pulmonary conditions.

As a result of his clinical experience, the author believes that any area of inflammation in direct contact with the diaphragm causes a reflex dilatation of the corresponding leaf of the diaphragm; whether the inflammation is in contact with the upper or under surface.

The fully-developed clinical picture presents the following five stages, which may coexist in any combination :—

1. "Dilatation" of the diaphragm, which can be seen by means of the ortho-diaphragm rising to the level of the fourth rib with expiration.
2. "Stasis" of the diaphragm, which accompanies more acute inflammations in which the upper level reaches the fourth rib.
3. "Distension" of the diaphragm by mechanical pressure of an enlarged liver.
4. Ascending inflammation producing pleurisy or pericarditis.
5. Descending infection producing bronchitis or broncho-pneumonia.

The diagnosis of amoebiasis is most readily made by observing the effects of emetine ; usually there is a total disappearance of symptoms by the fourth day.

Many facts collected by the author in course of his military duties convinced him that the lack of laboratory confirmation should not be permitted to weigh against a strong clinical suspicion of amoebiasis, nor should it be regarded as a contra-indication to emetine treatment. Accordingly, it is stated that the prevalence of the clinical signs detailed above constitutes a valuable guide to the frequency of amoebic infection in the community, and, further, that amoebiasis would seem to be a great deal commoner in endemic centres than either the prevalence of dysentery or the results of laboratory investigation would seem to indicate.

[The line of argument used throughout this paper is extremely difficult to follow. The author hardly does full justice to the laboratory findings of his clinical cases. Throughout there is a definite inclination to accept clinical data as conclusive, while discounting the value of accurate laboratory results ; whereas, it would have been better to consider them without bias.]

P. H. M-B.

HOSKIN (Jenner). Amoebic Dysentery complicating Malignant Disease of the Lower Bowel.—*Brit. Med. Jl.* 1921. Apr. 16. p. 563.

Entamoebae were found microscopically in the dejecta four months prior to death from carcinoma of the pelvic colon. The patient was a painter, aged 41, who had been in the tropics. Blood and mucus were passed continuously after the administration of emetine bismuth iodide. Autopsy revealed a large malignant growth, but no evidence of recent amoebic ulceration.

P. H. M-B.

HODSON (Vincent S.). The Treatment of Hepatic Abscess with Emetine.—*Jl. Trop. Med. & Hyg.* 1921. Apr. 15. Vol. 24. No. 8. pp. 108-109.

The treatment generally recommended for hepatic abscess is incision and drainage ; medical treatment has not been considered in any way as a substitute for the knife.

Two of the author's cases in which the abscess had ruptured through the lung recovered at once after the exhibition of emetine. Three cases are then cited as occurring in 1920 to prove the author's contention that emetine is a cure for liver abscess, but in none of them was the presence of pus in the liver actually proved by aspiration ; it was only inferred to exist.

[There is nothing novel in the exhibition of emetine in the usual therapeutic doses to all cases of proven or suspected hepatic abscess. It is a very ordinary procedure in tropical practice, but it has yet to be shown that a really large accumulation of pus in the liver will absorb by the action of emetine alone without aspiration.]

P. H. M-B.

GUNN (Herbert). **Amebic Gall Bladder Infections with Operation.**—Reprinted from the *California State Jl. of Med.* 1921. Jan.

Cites two clinical cases in which the gall bladder was opened at operation and living entamoebae were demonstrated in the walls of the viscus. The first case had three years previously suffered from hepatic abscess; the second from amoebic dysentery of seventeen years' duration. It would appear that the gall bladder may be involved without the presence of an adjacent hepatic abscess.

P. H. M-B.

CHATTERJEE (Gopal Chandra). **An Atypical Amoeba Causing Dysenteric Lesions.**—*Philippine Jl. Sci.* 1920. Oct. Vol. 17. No. 4. pp. 385-394. With 3 coloured plates.

The author claims to have discovered a new pathogenic entamoeba causing fatal dysenteric lesions in man and differing from *Entamoeba histolytica* in various minor points, such as the massive structure of the nucleus. This amoeba he proposes to designate *Entamoeba paradysenterica* sp. nov., though he thinks that the name may be subsequently dropped should the organism turn out to be a previously described species.

[The figures illustrating this paper are very poor, and one has to confess that neither in the descriptions nor illustrations can one detect any essential point in which the so-called *E. paradysenterica* differs from the familiar *E. histolytica*.]

P. H. M-B.

RODENHUIS (Y.). **Achtkernige cysten van *Entamoeba histolytica*.** [8-Nucleate Cysts of *E. histolytica*.]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1919. Vol. 59. No. 6. pp. 826-829. With 1 plate and 1 chart.

The author records that he has found no less than 29 cysts of *E. histolytica* containing eight nuclei apiece (instead of the usual maximum number of four), and one containing 12 nuclei. All were found in the stools of the same patient.

Reasons for attributing these cysts to *E. histolytica*, rather than to *E. coli*, are drawn from (1) their dimensions (13.5μ – 18.75μ); (2) their walls (thin, and without double contour in stained preparations); (3) their staining characters; (4) the grouping, and (5) the dimensions of their nuclei (1.5μ – 2μ in diameter); (6) the presence of chromatoid bodies. "Since points 2-6 speak directly for their being *E. histolytica* cysts, and point 1 is not against this, there is thus every reason to regard them as 8-nucleate cysts of *E. histolytica*." Five of the cysts are shown in a plate, alongside of an 8-nucleate cyst of *E. coli*. [It is now generally known that similar supernucleate cysts are occasionally formed by all species of intestinal amoebae, though they are very rare in *E. histolytica*. It seems probable that the cysts here described mostly

belong to this species, but the points on which the author relies are not conclusive. It is unfortunate that he has not paid more attention to the finer details of nuclear structure, and has not excluded—by prolonged examination of his patient's stools—the possibility of a concomitant infection with *E. coli*; for by these means alone can the identity of such cysts be established with certainty.]

Clifford Dobell.

RODENHUIS (Y.). **Bijdrage tot de kennis van de joodcysten en hunne amoeben.** [Contributions to our Knowledge of "Iodine Cysts" and their Amoebae.]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1919. Vol. 59. No. 6. pp. 813-825. With 1 plate and 2 charts.

In this paper the author describes his observations upon the well-known "Iodine Cysts" found in human faeces, and upon the amoebae which form them. He proposes to change the name of the organism to "*Endolimax puleonucleatus* Brug." [This is not allowable. The amoeba is not an *Endolimax*; it already has a specific name; and it is improper to credit BRUG with a combination of names which he never used. The correct name of the amoeba is *Iodamoeba bütschlii* (Prowazek) Dobell.]

The author gives a somewhat lengthy account of his observations, but adds little that is new. A considerable part of his paper is occupied with arguments to prove that *I. bütschlii* is a species distinct from *Endolimax nana* and an [unidentifiable] organism called a "wild limax-amoeba," which he also studied. [Few will now doubt the correctness of this view.] Four human cases of infection were studied, and attempts were made to infect "four kinds of animal" [species not stated] with the amoeba, but without success.

The dimensions of the amoebae are compared with those of their cysts, and the measurements shown in a curve. The amoebae are stated to measure from 4.5μ to 15.75μ or more [presumably in diameter, when rounded. In the curves, the mode appears to lie at 10.5μ for the free forms, and at 9.75μ for the cysts. Unfortunately the method used in making these measurements is not described, but the number of individuals measured is too small for the results to have much significance.] Of greater interest and novelty are the author's observations upon the division of the amoeba. He was able to find several stages which are described and figured. The division of the nucleus is said to be intermediate between an amitosis and a "promitosis." [The details of the process are not convincingly exhibited.]

The observations of previous workers are not adequately considered, though a few of them are mentioned. The paper is illustrated by a plate of 46 figures, which would have been more valuable if greater attention had been paid to the delineation of the finer cytological details.

Clifford Dobell.

BRUG (S. L.). **Die Jodzysten.** [The "Iodine Cysts."]—*Arch. f. Schiffsu. Trop.-Hyg.* 1921. Vol. 25. No. 2. pp. 47-58. With 4 text figs.

This paper contains a good account and critical descriptions of the "iodine cysts" and their corresponding amoebae; but its chief interest is centred on that interminable tragical-historical business—nomenclature. By the courtesy of Professor MAYER, of the Hamburg

Institute, the author has been able to scrutinize one of PROWAZEK's original preparations labelled, in PROWAZEK's own handwriting, "Amöben-Salaisila-Sawai-Williamsi." The preparation is stained by the Heidenhain method. It contains *coli* cysts and free *coli*, and at least four well-stained amoebae which are *not coli*, but are "Iodine-amoebae." These the author figures.

The author himself has not been able to compare these amoebae with PROWAZEK's original preparations of *Entamoeba bütschlii*, but he has obtained from Dr NÖLLER, of Hamburg, drawings made from one of PROWAZEK's original preparations of that species. These drawings are reproduced for comparison with those taken from the *coli plus Williamsi* preparation. The author, after scrutiny of the latter preparation, states confidently that the specific names *Williamsi* and *bütschlii* denote one and the same thing, and concludes with a tabular summary where *Iodamoeba bütschlii* appears as one of the numerous synonyms of *Entamoeba williamsi*.

A. A.

NÖLLER (W) **Ueber einige wenig bekannte Darmprotozoen des Menschen und ihre nächsten Verwandten.** [Some Little Known Intestinal Protozoa of Man and their Relationship.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 2. pp. 35-46.

This is a paper of a generally instructive kind. The main point of interest is a discussion of the question of nomenclature raised in BRUG'S paper on "The Iodine Cysts." The author refers particularly to one of PROWAZEK's original preparations in the Hamburg collection, which suggests that PROWAZEK himself appears to have had some suspicion that he had confused his names. This preparation, which is stated to be rich in material, well stained, and very little faded, is inscribed: var. *E. bütschlii*, *Entamoeba williamsi*, and also shows many *Entamoeba coli* cysts. The author remarks that nomenclature is now a right difficult business, and comes to the sensible conclusion that since PROWAZEK ultimately described *bütschlii* when he had nothing but "Iodine-cyst-amoebae" in front of him, preference must be given—although pedantry may split hairs on precedence—to the specific name *Iodamoeba bütschlii* for the amoeba of the iodine cysts.

A. A.

BACILLARY DYSENTERY.

MACLEOD (George) **Notes on the Epidemiology of Bacillary Dysentery,** —*Public Health.* 1921. Feb. Vol. 34. No. 5. pp. 81-84.

The facts upon which this rather discursive paper are based were originally contained in an M.D. thesis submitted in 1919.

The experience was obtained in a mobile laboratory in France and Flanders. The following figures were obtained in 1918 in the Somme area:—

At the height of the epidemic the admissions to hospital became so great that bacteriological examination of all cases became impossible; it was therefore decided to evacuate all cases with definite clinical evidence of the disease, and to concentrate on the examination of doubtful cases. Specimens taken by means of a rectal swab were examined from 1,513 cases of this category, three examinations on

successive days being made in each case, and by this means the presence of 298 cases, or 19 per cent., of bacillary dysentery was discovered in this group. Out of 298 positive findings 15 were due to Shiga's bacillus. The spread of infection in a unit usually commences with the advent of the warm weather in May or June. Sporadic mild cases of diarrhoea usually at first occur, but the cases gradually increase in severity until the disease becomes endemically established.

There is some evidence, mainly conjectural, that bacillary dysentery arose from drinking "shell-hole water" in France.

P. H. M-B.

STRASBURGER (J.). **Ueber chronische bazilläre Ruhr und Ruhrfolgen.** [Chronic Bacillary Dysentery and its Sequelae.]—*Deut. Med. Woch.* 1921. Apr. 21. Apr. 28; May 5. Vol. 47. Nos. 16, 17 & 18. pp. 441-443; 463-465; 499-500.

This paper is a lengthy but highly instructive discourse on chronic bacillary dysentery.

It is difficult to estimate in a disease of such varying intensity as bacillary dysentery the exact proportion of cases which become chronic—probably about five per cent. do so. The author is of the opinion that in the majority of cases the chronic stage follows closely upon the acute: that is to say, it is exceptional to find a chronic bacillary dysentery commencing as a relapse after apparent recovery. One should distinguish between the ulcerative and dyspeptic forms of chronic bacillary dysentery. Many patients with the ulcerative form are in otherwise good health; in these, small, superficial, friable ulcerations can be demonstrated by the sigmoidoscope in the lower part of the bowel; the lesions can be best appreciated when examined by means of the microscopic attachment of Ringlet with which some instruments are provided. Probably the chronic carriers of the dysentery bacillus belong to this category.

The author has seen a few cases resembling advanced ulcerative colitis, patients who pass for months on end liquid faeces intimately intermingled with blood and mucus. The greater proportion of these eventually died.

The dyspeptic form is quite a distinctive one. Symptoms referable to a disturbance of gastric functions follow immediately upon the acute attack. The faeces are foul-smelling and sour, and contain undigested portions of food, such as vegetable remains and muscle fibres. The urine is rich in indican. Such tests as were performed (SCHMIDT and KASHIWADO) upon the pancreatic function indicated that that organ was not in any way involved. On minute examination of the faeces in these cases evidence of the destruction of the mucosa will be found in the mucus and the presence of inflammatory cells. At autopsy the ulceration of the large intestine in these cases cannot be distinguished from the frankly ulcerative form.

Chronic bacillary dysentery patients are generally extraordinarily pallid and cachectic; sometimes oedematous. The author regards this cachexia as being due not so much to the intestinal ulceration as to the chronic absorption of dysenteric toxins. The difficulties attending the isolation of dysentery bacilli from acute cases are well known, but they are accentuated in the chronic forms. Nevertheless, occasionally the bacteriologist is successful, the most promising results being obtained from cultures of mucus obtained by means of rectal

swabs. The author, in Roumania, had a series of successful cases even after six months interval. The difficulty attending isolation of dysentery bacilli in chronic cases may be ascribed, as ADAM has suggested, to the presence of antibodies in the stool. Apparently, in chronic cases, agglutination tests with the patient's serum are of little or no value.

The sequelae of chronic dysentery should not include arthritis, conjunctivitis and urethritis, which should be more properly regarded as complications. Sequelae are in reality post-dysenteric complications, the direct result of a past infection or virus which has died out. Amongst these sequelae are numbered the various neuralgias, forms of neuritis and myalgias. Hypersensitiveness of the bowel towards certain articles of food remains a feature for months after an attack of average severity; the patient is apt to suffer from time to time from bouts of diarrhoea, and is more apt than formerly to contract bowel infections of all kinds. Then there are bowel irregularities due to excessive destruction of the mucosa and its replacement by fibrous tissue. These pathological changes provoke attacks of diarrhoea; possibly the diarrhoeic condition of the faeces is brought about by the failure to absorb fluids from the large intestine. The stools in this condition are fluid, and contain no inflammatory cells, nor is the diarrhoea associated with any disturbance of nutrition. Gastric complications are represented either by an achlorhydria, hypochlorhydria or flatulent dyspepsia. Chronic catarrh of the mucosa produces mucoid stools. Adhesions frequently form, starting from small punctiform perforations on the peritoneal surface. Exudation of serum through the peritoneal coat may actually take place in the acute stage of dysentery and lead to the formation of extensive cicatricial bands. Stenosis of the large intestine may take place, but is excessively rare; in one case narrowing of the lumen was found in the sigmoid colon.

As regard treatment, Strasburger is of the opinion that though antidysenteric serum has proved of inestimable value in the acute stages of bacillary dysentery, it is quite impotent in the chronic. During the winter of 1917-18 the injection of milk into the bowel was tried, with the idea of activating the cells of the mucosa; the results were inconclusive. Vaccine treatment is considered to be the right line, but has not as yet received sufficient trial to form any judgment upon. The dyspeptic cases of chronic bacillary dysentery should be treated upon general dietetic lines.

P. H. M-B.

KEERSMAKERS. **A propos d'une épidémie de dysenterie.**—*Arch. Méd. Belges.* 1921. Jan. Vol. 74. No. 1. pp. 1-8.

During the summer of 1920 a small epidemic of Flexner dysentery broke out in the Brussels garrison. It is thought that, as a result of the war, Belgium must contain numerous endemic foci of the disease. The present epidemic seems to have been spread by a Belgian soldier, a returned prisoner from Germany, apparently a carrier of bacillary dysentery. It began in June and ended in September, and affected altogether some 170 men. The symptoms appear to have been very mild.

Milk was completely excluded from the dietary, which consisted mainly of soups. Benzol and formalin rectal enemata were given daily; a formula producing a satisfactory emulsion is given as follows:—

Benzol	..	..	..	..	..	4 gm.
Forty per cent. Formaldehyde	..	..	..	..	..	5 drops
Tragacanth	..	..	..	..	..	1 gm.
Glycerine	..	..	..	..	..	5 gm.
Water	..	..	..	..	to	150 cc.

This should be preceded by a plain soap-and-water enema. Most of the cases were injected with a polyvalent Flexner vaccine (50 millions of bacilli per cc.) according to the method of Professor RATHERY. Reactions were uncommon.

P. H. M-B.

MANSON (J. S.) & MITCHELL (H. A.). **A Note on a Small Outbreak of Dysentery in a Provincial Town.**—*Lancet*. 1921. April 16. p. 802.

Dysentery of the bacillary type broke out in September 1920 in Warrington. In all there were seven cases, with one death, all in the same row of houses and four in the same family. A bacillus resembling the Y bacillus was isolated, and serums from the cases markedly agglutinated cultures of this organism. The source of the infection could not be traced.

P. H. M-B.

DOPTER. **Le pouvoir pathogène des bacilles de Morgan et de Castellani (Syndrome entérohémorragique).**—*Bull. Acad. Méd.* 1921. Mar. 8. Vol. 85. No. 10. pp. 301–308.

Dopter records a case which proved rapidly fatal, and in which Morgan's bacillus appeared to be the exciting cause. The symptoms were those of an acute haemorrhagic enteritis comparable to that recently described by BESSON and LAVERNE. The entire mucosa of the small gut was inflamed. Peyer's patches were engorged, and numerous petechiae were present on the mucous surface; the large intestine, on the other hand, appeared to be perfectly normal. Possibly cases of acute enteritis which occurred comparatively frequently during the war from drinking contaminated water might have been due to the same organism. The Morgan-Castellani type of bacilli, isolated from cases of this nature by BESREDKA, proved to be exceedingly toxic to mice and to rabbits, and in the latter animal the bacilli injected intravenously reproduced pathological lesions identical with those observed in man.

P. H. M-B.

PRZESMYCKI (F.). **Przyczynę do bakteremji w czerwonce. (Sur la bactériémie dans la dysenterie.)**—*Przegl. Epidemjol.* Warsaw. 1920–21. Vol. 1. No. 3. pp. 361–362. [French summary. p. 363.]

This paper records the successful cultivation of Shiga's bacillus from the blood-stream in bile-medium in two cases.

P. H. M-B.

LAUBER (Ilse). **Bakteriologische Untersuchungsergebnisse der Mannheimer Ruhrepidemie Juli bis November 1917.** [Bacteriological Researches on the Mannheim Dysentery Epidemic, July-Nov. 1917.]—*Cent. f. Bakt.* 1 Abt. Orig. 1920. Mar. 15. Vol. 84. No. 3. pp. 201-213. With 2 text figs.

At the beginning of July 1917 a severe dysentery epidemic made its appearance in Mannheim; during that month cases rapidly increased to 266, while by the end of the summer 1,183 persons had been admitted to hospital for dysentery or suspected dysentery. In the author's opinion, house-flies were undoubtedly responsible for the spread of the epidemic; not for many years had such a plague of flies been noted in the town as during the dysentery scare. Shiga bacilli were successfully isolated on two occasions from flies trapped in the dysentery ward. Altogether 864 faecal specimens were plated out, and in 42 per cent. dysentery bacilli were isolated: in 37 per cent. Shiga's bacillus, in the remaining 5 per cent. Flexner's bacillus.

It is highly necessary to keep stool specimens sent for laboratory examination as cool as possible; in some instances it was possible to obtain successful cultures from specimens kept as long as ten days in the ice-chest; on the other hand, it was impossible to isolate the dysentery bacillus from foetid stools. At room temperature bacilli could still be successfully isolated from three-day-old stools, while a very short period in the incubator sufficed to kill them all off. The presence of *B. proteus* in dysentery stools is in no way to be regarded, as stated by various bacteriologists, as constituting an additional etiological factor in dysentery, but as evidence that gross putrefaction has taken place. The agglutination reaction of the serum should be regarded as a definite aid to diagnosis, only gross floccular clumping being regarded as positive. In 3·4 per cent. out of 833 tests a negative agglutination reaction was obtained, though at the same time specific bacilli were isolated from the faeces. Seventy-nine autopsies were obtained with distinctive intestinal lesions, and in 13 of these the serum abstracted after death failed to clump these organisms. Definite fluctuations in the agglutinin content of the serum were observed; it is therefore advisable to repeat this test at the end of the second and third weeks of the illness.

The peritoneal exudate obtained from the cadavers after the eighth day of illness contained a larger amount of agglutinins than the blood-serum of the same cases. Specific agglutinins could be demonstrated in the pleural and pericardial fluids, though their titre was considerably lower than that of the serum or peritoneal exudate.

P. H. M-B.

LOEWENHARDT (Felix E. R.). **Ueber gegenseitige Beziehungen der Agglutinine des Bazillus X 19 und der Typhus- und Ruhrgruppe.** [The Mutual Relationship of the Agglutinins of Bacillus X 19 and of the Typhoid-Dysentery Group.]—*Cent. f. Bakt.* 1. Abt. Orig. 1920. Mar. 15. Vol. 84. No. 3. pp. 191-201.

It is well known that typhus serum is "polyagglutinable"; that is to say, that it possesses the power of agglutinating organisms of the typhoid-dysentery group in addition to *Bacillus proteus* or X. 19. This paper records many minute experiments with different strains of these organisms with the object of explaining the meaning of this phenomenon.

The detailed protocols are difficult to abstract ; it is therefore more profitable to give the gist of this elaborate paper.

Co-agglutination of the enteric group should be distinctly distinguished from a similar agglutination of the dysentery group. The appearance of enteric agglutinins is possibly the result of stimulation of antibodies elaborated in the blood at some previous period. The co-agglutination of the dysentery group can be attributed to a certain affinity between the dysentery and X. 19 antigens. Saturation of typhus serum with X. 19 removes both the homologous antibodies ; and, conversely, saturation of the same serum with dysentery organisms removes the agglutinogens of X. 19.

On the other hand, an artificially produced X. 19 immune serum contains no co-agglutinins to other organisms.

The Weil-Felix reaction is not a strongly specific reaction, and at the best can be considered as a kind of paragglutination. Thus one can understand how it comes about that other *proteus* and *coli*-organisms, and even some races of *B. pyocyaneus*, are fully agglutinated by typhus serums. It may be that the receptors of typhus serum (according to EHRLICH'S side-chain theory) are very simple in nature.

The explanation of these anomalies cannot be found in a simple physico-chemical basis, for no comparison between the results of acid-agglutination of the organisms and serum agglutination can be made.

P. H. M-B.

CZAPLEWSKI. **Zur Bakteriologie der Ruhr.** [The Bacteriology of Dysentery.]—*Cent. f. Bakt.* 1. Abt. Orig. 1921. Feb. 28. Vol. 85. No. 6-7. pp. 105-113.

In this paper the author admits his inability to verify the presence of known strains of dysentery bacilli in cases of acute dysentery occurring in Cologne ; on the contrary, he thinks the epidemics in that city are to be ascribed to an encapsuled bacillus belonging to the type *B. acidi aërogenes*. He considers this organism as being very toxic, especially to young children. The capsule of this bacillus can be demonstrated by a special method termed the Boni-Czaplewski method.

P. H. M-B.

ELIAVA (G.) & POZERSKI (E.). **Sur les caractères nouveaux présentés par le Bacille de Shiga ayant résisté à l'action du bactériophage de d'Herelle.**—*C.R. Soc. Biol.* 1921. Apr. 23. Vol. 84. No. 14. pp. 708-710.

D'HERELLE'S bacteriophagic bacillus devours the Shiga bacillus with great avidity, but the colonies of the latter organism which escape destruction are said to differ from the Shiga strain originally used in the experiment in various minor ways. For instance, they are no longer agglutinated by specific anti-Shiga serum in so high a titre, their morphology is altered, and they no longer cause turbidity in bouillon. Sub-cultures of this new organism are much more resistant to the bacteriophagic bacillus than are similar cultures of the original Shiga bacillus.

P. H. M-B.

VINCENT (H.). **Vaccination against Bacillary Dysentery with Ethero-Vaccine.**—*Jl. State Med.* 1921. Feb. Vol. 29. No. 2. pp. 54-57.

The frequency with which painful reactions followed the injection of antidyenteric vaccine constituted an almost insurmountable obstacle to its continued employment as a prophylactic. The vaccine employed by the author was made from young cultures of five strains of the Shiga bacillus, one of the Strong type, two of the Flexner, and four of the Y type; the emulsions being killed by ether. In rabbit experiments this ether-vaccine conferred a complete immunity on these animals.

The outbreak in which this vaccine was first used in man occurred in a concentration camp and was due to Shiga's bacillus. The infection, at first mild, became gradually more and more severe. 250 million bacilli when injected caused no reaction, so larger doses of 500 and even 750 million bacilli were utilized, the last-named dose being injected into 1,575 men. The reactions were less numerous and severe than those following antityphoid inoculation. Out of 2,175 men who received 500 to 750 million bacilli, 15 suffered from either headaches or giddiness, six had temperatures of 38° C. and one of 40° C. Local pain was slight; neither oedema, redness nor enlargement of the glands was noted. On the day following the injection, 15 men showed unmistakable symptoms of incipient dysentery, which proved to be of a very mild type, with the exception of one man who was not admitted to hospital till moribund. Before vaccination commenced there had been 500 cases of dysentery (a proportion of one man in six of the total strength), during the five days following the vaccination the number of cases actually increased, but very soon a rapid decline took place.

The effects of immunization of men follow those laid down by DOPTER for experimental animals. That is to say, it takes about 15 days for immunity to develop. The protection afforded may be indicated by the fraction $\frac{1}{12}$; that is to say, the vaccinated are 12 times less liable to an attack than are the non-vaccinated. A polyvalent vaccine containing 1,000 million dysentery bacilli per cc. is now prepared; one injection in doses from 1.0 cc.—1.5 cc. is recommended according to the physique of the person to be inoculated.

P. H. M-B.

CANTUERN (J.). Contribution à l'étude du traitement des syndromes dysentériques et des diarrhées chroniques par les stock-auto-vaccins.—*Thèse Fac. Méd. Lyon.* 1921. 64 pp. [Summarized in *Bull. Inst. Pasteur.* 1921. Mar. 15. Vol. 19. No. 5. pp. 175-176.]

Failing to isolate Shiga's bacillus from the faeces of serious cases of dysentery in Corfu and Salonica, the author paid attention to various para-colon-pseudo-dysentery and Proteus organisms with which he prepared a vaccine. The results of inoculation commencing with about 25 millions of organisms in $\frac{1}{4}$ cc. are said to have given highly satisfactory results in cases in which no entamoebae were present in the stools!!

P. H. M-B.

MIXED AND UNCLASSIFIED.

COOK (L.). **The Cause of Dysentery.**—*Indian Med. Gaz.* 1921. Mar. Vol. 56. No. 3. pp. 81-83.

The author of this paper attempts to minimize the rôle of the amoeba and the dysentery bacillus in causation of dysentery, but lays stress upon predisposing causes which have been overlooked. In the absence,

he says, of definite proofs that the amoeba or some bacillus is the cause of dysentery, one is faced with the hypothesis that these so-called exciting causes are dependent upon a predisposing cause, and that in these days the pendulum has swung too far, and the exciting causes have entirely overshadowed the predisposing causes of the disease.

P. H. M-B.

NICLOT. **La dysenterie en 1915 et 1916, a l'Armée d' Orient. Discussion statistique.**—*Arch. Méd. et Pharm. Milit.* 1919. Oct. Nov. Dec. Vol. 72. Nos. 10, 11 & 12. pp. 66-76. With 2 text figs.

This paper embodies an account of dysentery from a purely military administrative point of view as it occurred amongst the French troops in the Army of the Orient in 1915 and 1916. The relationship between dysentery and hepatic abscess, which was said to be very rare or non-existent in Macedonia, and the influence of malaria upon dysentery are discussed, but no information of interest is brought forward.

P. H. M-B.

DE MEDEIROS (Calixto). **Syndrome dysenteroide na syphilis.**—*Brazil Medico.* 1920. Mar. 20. Vol. 34. No. 12. pp. 189-190.

Detailed histories of two cases presenting a complete clinical picture of dysentery and unsuccessfully treated on antidyenteric lines. In each case there were strong grounds for suspecting a syphilitic taint, and mercurial treatment brought about rapid and complete cure.

F. S. Arnold.

GOTÔ (Seiichi). **[Urine of Patients with "Ekiri" and Dysentery.]**—*Jika Zasshi (Jl. of Pediatrics).* 1919. Dec. 20. No. 235. pp. 1150-88.

Chemical examination of the urine was carried out in four cases of "Ekiri," one case of convalescence from this disease, and four cases of dysentery.

(1) The quantity of urine does not change at first; then a marked decrease sets in, presumably from a temporary disturbance in the functions of the heart and kidneys. It attains the normal figure after a few days, and during convalescence it increases remarkably. (2) Acidity is high during 3-4 days at the beginning from increased amount of organic acids, such as aceto-acetic, β -oxy-butyric, and uric. (3) Nitrogen is found somewhat increased in an early stage, and the ammonia-coefficient is usually high. (4) Acetone and β -oxy-butyric acid are found in a great quantity in "Ekiri," which shows toxicosis, as well as in serious cases of dysentery. (5) In view of the occurrence of (a) increased acids, especially of abnormal organic acids, (b) increase of ammonia-coefficient, and (c) deep breathing in cases of toxicosis, there is no doubt as to the presence of acidosis.

Hiroshi Ohshima.

KAWADA (Keiji). **[Therapeutics of "Ekiri."]**—*Jika Zasshi (Jl. of Pediatrics).* 1920. July 20. No. 242. pp. 25-37.

By the term "Ekiri" is meant an acute disease which usually attacks children of 3-6 years of age in certain infected districts. After variable symptoms, such as a slight fever, indigestion, &c., there occurs a sudden rise of temperature, accompanied by the discharge of mucous faeces, an indistinct consciousness, convulsions, and cardiac

debility, and in most cases, at or about the end of a period of 24 hours, either death or rapid convalescence follows. As to the cause of the disease, there is no settled opinion. It frequently occurs in association with dysentery, and in a majority of cases the dysenteric bacillus are found. A special form of bacillus was discovered by ITO (1898), but recently MINODA has discovered some heterotypic forms of bacilli, of which, he remarks, the nearer to *B. coli*, the stronger is their toxic effect.

The author treated the patients with dysentery serum or some heart tonics with hardly any effect. But of late years, since he adopted the injection of adrenalin, he has been able to cure 14 patients out of 15.

Early diagnosis, administration of an enema in the early stage, complete rest, sufficient supply of drink, injection and internal use of adrenalin are the most effective remedies for the disease.

H. O.

CORDES (W.) **Zur Therapie der Balantidienkolitis.** [Treatment of Balantidial Colitis]—*Munch. Med. Woch.* [1921. April 22. Vol. 68. No. 16. p. 484.

The patient was a pork butcher from Holstein, who had been slaughtering pigs for the last 30 years.

In August 1919 symptoms of diarrhoea commenced. The balantidia were numerous and easily demonstrable. The diagnosis was confirmed by the sigmoidoscope, and revealed superficial ulcerations of varying size and depth. The infection was apparently eradicated by emetine-therapy given in 0.1 gm doses by the intravenous route on three consecutive days.

The author considers that emetine is as specific for balantidial colitis as it is in amoebic dysentery

P. H. M-B.

SPRUE.

BROWN (Thomas R.). **A Note on the Administration of Pancreatic Extract in the Treatment of Sprue.**—*Jl. Trop. Med. & Hyg.* 1921. April 1. Vol. 24. No. 7. pp. 90-92.

In 1916 the author reported the complete absence of pancreatic ferments in a case of sprue [see this *Bulletin*, Vol. 9, p. 197], and since then he has encountered four additional cases. The pancreatic ferment was estimated in the stool and in the duodenal contents obtained by means of the Einhorn bucket.

The patient's bowels were moved the night before, and a definite amount of milk containing four per cent. of fat administered. The faeces passed subsequently were diluted to a definite amount, centrifuged, and estimated for trypsin and diastase, the Fuld casein method being employed for the former, the Wohlgemuth method for the latter, while for the estimation of lipase one per cent. monobutyrin was used. The absence of pancreatic ferment was so striking that, in addition to the rest and dietetic treatment, pancreatic extract 5-10 gm., with 20-40 gm. of calcium carbonate, were administered three times a day, two hours after the larger feedings. Improvement in the patient's condition immediately occurred. One case did not respond to treatment. The author considers that in four out of the five cases there could be no question that the administration of pancreatic ferments led to a very marked improvement in the condition of the patient.

P. H. Manson-Bahr.

CASTELLANI (Aldo). **The Treatment of Sprue by Massive Doses of Sodium Bicarbonate.**—*Brit. Med. Jl.* 1921. Mar. 5. pp 338-339.

The administration of massive doses of sodium bicarbonate by the mouth (5i three times a day for the first three days, 5ii t.d.s. for 8-10 days, and subsequently 5iii t.d.s. for several weeks) may be followed by good results. In six cases sodium bicarbonate has been given intravenously—in doses of $\frac{1}{2}$ to 1 pint of a 2 or 4 per cent solution. The injection may be made every day or every other day until twelve have been given. Cases treated as above are said to improve more rapidly than when treated by dietetic measures alone.

P. H. M-B.

KRAUSS (William). **Studies of Monilia in Connection with Sprue.**—*Amer. Jl Trop. Med.* 1921. Mar. Vol. 1. No. 2. pp 119-126.

This paper cannot be considered a serious or important contribution to our knowledge of sprue; it is, in fact, a tedious account of a lady patient in Memphis treated at first successfully by diet, but subsequently—the patient tiring of the monotony—by an autogenous vaccine of *Monilia* prepared by MICHEL from material sent all the way to him in Porto Rico! This vaccine is now termed "bacterin." Later a *Monilia* was isolated from the patient's faeces by the author of this paper.

The progress of the patient is illustrated by a chronological table, of which a few extracts may be quoted :—

- " January 24, 1920.—Michel vaccine, 1 cc in arm. Usual reaction. Pain and prostration, no fever, diarrhoea, subsidence of symptoms on third day. . . .
- " February 13, 1920.—Feeling badly ; depressed and apprehensive ; wants me to wire Surgeon-General to hurry Dr. Michel . . .
- " February 13, 1920.—Inject pig [? guinea-pig] with 10 cc suspension [of ? monilia culture]. . . .
- " February 15, 1920.—Pig very much prostrated, falls down, refuses food.
- " February 16, 1920.—Pig nibbles at food. . . .
- " April 3, 1920.—0.5 cc. vaccine. Very pleasant reaction. . . .
General condition so improved as to arouse comment of friends."

The evidence for enthusiasm for the vaccine treatment of sprue may be said to rest upon a very slender foundation.

P. H. M-B.

SIMON (Sidney K.). **Some Observations on Sprue and its Prevalence in the South.**—*Southern Med. Jl.* 1921. April Vol. 14. No. 4. pp. 255-260.

This paper contains no original observations, but summarizes the recent literature on the subject, all of which has been adequately reviewed in the *Bulletin*.

P. H. M-B.

BERIBERI.

MCCLOSKEY (A. J.). **The Effect of the Control and Rationing of Rice on Beriberi.**—*Indian Med. Gaz.* 1921. Feb. Vol. 56. No. 2. p. 41.

The author, who was acting P.M.O. of the Federated Malay States, draws attention to the fact that the reduction of the rice ration and substitution, to a great extent, of Rangoon rice for Siam rice reduced very markedly the incidence of beriberi, as shown in the following table :

	No. of beriberi cases treated		Ratio of beriberi to total treated of all diseases	
	1919.	1920	1919	1920
Perak	504	57	2.2 per cent	0.2 per cent
Selangor	673	173	4.2 ..	0.9 ..
Negri	653	153	9.4 ..	1.8 ..

The control of rice came into force in July 1919, and rationing in January 1920, in Perak, and in February, March and April in different parts of Selangor. [It is possible that other factors may have also influenced the number of beriberi cases noted.]

P. W. Bassett-Smith

DUFOUGERÉ (W.). **Ankylostomiase et Bériberi en Guyane française.**—*Bull. Soc. Path. Exot.* 1920. July 7. Vol. 13. No. 7. pp 603 617.

Ankylostomiasis, due to the presence of *Necator americanus*, is very prevalent in French Guiana. It affects most heavily the penal population (70-80 per cent.), but is found also in the civil and military community (20-40 per cent.). In 1918-19 an epidemic of beriberi appeared, the colony having been free from this for many years, and it coincided with a marked diminution of the food ration of the prisoners—a secondary consequence of the war, due to difficulty of transport, etc.—decorticated rice being the essential basic diet. It is noted that the total calories per man were less than 2,000, and the essential anti-beriberi foods were also greatly reduced. He points out that 3,000 calories is the least that should be given if a prisoner is to continue at hard work. He does not think that the ankylostome infection was the cause of the beriberi, but that its origin was purely due to a deficiency diet. The amount of parasitic infection did not bear any constant relationship to the oedema, cases cured of the former were not relieved of the latter, and in some cases no infection was noted—at least ova were not found. He also shows that there was no evidence of the beriberi in the prison being contagious. He quotes cases and describes instances of fatal cardiac attacks. The cases were usually of the wet type, and the phosphates and urea excreted in the urine were greatly reduced. The substitution of red rice for the white rice brought about a great reduction of cases, and in 1920 the Director of the Prison Administration made two notable changes, (1) increase of bread from

600 to 750 gm., (2) substitution of haricot beans for rice, twice a week ; but the author states that this is not sufficient, a greater variety of foodstuffs is required, and the total calories must be increased to 3,000, with a correct proportion of protein, carbohydrates, etc.

P. W. B-S.

ROGER (Henri). **Quelques cas de Béribéri en France.**—*Médecine* Paris. 1919. Dec. Vol. 1. No. 3. pp. 151-152.

The Chinese and Indo-Chinese who landed at Marseilles during the war showed a rather heavy incidence of beriberi, mostly of the dry type. The condition was definitely due to the diet, chiefly white rice, and was favoured by conditions of unsatisfactory hygiene on board the ships. After landing there were practically no fresh cases, and cure was effected by change of diet.

P. W. B-S.

HIROTA (T.). [**Further Notes on Infant Beriberi.**]—*Tokyo Iji Shinshi* (*Tokyo Med. News*) 1920. Jan. 1. No. 2158. pp. 1-3.

The author calls attention to the fact that in some cases of infant beriberi the usual symptoms, such as vomiting milk, groaning, hoarse voice, etc., are entirely absent. Four aberrant cases are described, in which, although many ordinary symptoms were lacking, gasping and frequency of pulse were met with. The author regards these as the most important characteristics of the disease.

Hiroshi Ohshima.

INABA (I.). [**Definition and Classification of Infant Beriberi.**]—*Jika Zasshi* (*Jl. of Pediatrics*) 1920. Jan. 20. No. 236. pp. 75-97.

The failure in the circulatory system and the presence in the mother of symptoms of beriberi are still regarded by many workers as indispensable for the diagnosis of infant beriberi. The author criticizes this idea, and shows that there are cases where there is no failure in the circulatory system, and no symptom of beriberi is recognisable in the mother, but in which the disease should be classed as infantile beriberi. A definition proposed by the author is : " Infantile beriberi is a disease only found in the infant fed on human milk. Besides those symptoms recognisable as general and in the digestive system, there are found some of the particular symptoms in the circulatory system, peripheral nervous system and brain, and oedema of the skin. It can be cured by weaning the infant at a suitable time, or limiting the amount of milk. The presence of beriberi in the mother may not be proved in some cases." The symptoms found in all cases are : loss of flesh, relaxed tissues, pale complexion ; the child is cross, nervous and depressed, slightly feverish, vomits milk, and has diarrhoea or constipation.

Five different types can be distinguished, viz. : (1) The type characterized by the failure of the circulatory system, causing dilatation of the heart, frequent pulse, gasping, groaning, etc. ; (2) the type in which oedema is characteristic ; (3) the type in which paralysis of peripheral nerves occurs, causing hoarse voice, squint, amblyopia, etc. ; (4) the type in which the brain becomes affected, but without sign of meningitis ; and (5) the mixed type, where no single characteristic is distinct. One or several examples for each type and some transitional cases are described.

H. O.

FUNK (Casimir) & DUBIN (H. E.). **Experiments on a Quantitative and Qualitative Test for Anti-Beriberi Vitamine.**—*Proc. Soc. Experim. Biol. & Med.* 1920. Vol. 17. No. 8. pp. 175-177.

These experiments were a further development of work done by WILLIAMS, BACHMAN, and EDDY to prove that vitamine activity can be measured by the growth of yeast cells [see this *Bulletin*, Vol. 17, p. 204], which method would, if reliable, reduce the number of animal experiments required, at least in the early stages of fractional estimation.

The method consists in placing a loopful (size not stated) of a 48-hour yeast culture in a definite quantity of Naegeli's solution for four hours in a shaking machine; after which the following mixtures were made: (1) Yeast suspension plus Naegeli; (2) vitamine solution (autolysed yeast) plus Naegeli; and (3) vitamine solution plus yeast suspension plus Naegeli.

These are incubated for 20 hours at 30° C.; the fermentation is then stopped by heating the tubes to 70° C. The different samples are then centrifuged in special tubes, and the results read off at once. Everything must be done in duplicate with sterilized apparatus. Definite curves could be plotted out showing the sensitivity of the method, which was very high. Tests for specificity to B vitamins were carried out. Allantoin, hydantoin, nicotinic acid, several purin and pyrimidine bases, amino acids, and pilocarpine were inactive; thyroid and pituitary body, as well as urine, were active; further experiments are being carried out. It would appear that the amount of vitamine in crude extracts varies with the amount of impurities present, which points to the necessity of using very pure extracts.

P. W. B-S.

FINDLAY (G. Marshall). **An Experimental Study of Avian Beriberi.**—*Jl. Path. & Bact.* 1921. Apr. Vol. 24. No. 2. pp. 175-191. With 1 chart in text.

The experiments were carried out to determine the rôle of vitamine B in normal metabolism. Forty-three fowls and 41 pigeons were used. The former were divided into three groups, 15 being fed exclusively on polished rice, 12 being controls on mixed grain, and 12 receiving water only to compare the effects of simple starvation with the former. Of the pigeons 15 were fed on polished rice, 12 were controls, and 6 were kept on oats and maize plus one-tenth body-weight of yeast every second day. The average period of incubation in fowls was 31 days, in pigeons 27 days; it was slightly shortened in the males and as the result of exertion. Birds fed with graduated doses of yeast prior to the experiment showed that the tissues were probably able to store up a limited amount of vitamine B. The clinical symptoms found and the histological results obtained are very fully described, and a chart is given showing the variations in weight of a beriberi fowl, starved fowl, and control. Some biochemical experiments were also done to determine the quantitative relationship of vitamine B and nucleic acid in the organs of an ox, and their curative values. The results of the work are best given in the conclusions supplied by the author.

Conclusions.—" (1) The main clinical symptoms of avian beriberi are all referable to a functional paralysis of the central nervous system.

" (2) The histological changes produced in fowls and pigeons by a diet of polished rice are for the most part similar to those in inanition, but may be differentiated by :—(a) the evidence of nuclear degeneration ; (b) the chromatolysis of the cells in the central nervous system ; (c) the retention of lipoid in the adrenal cortex.

" (3) The nucleic acid content and the vitamine B content of the organs of the ox are related quantitatively.

" (4) As contrasted with normal birds, the livers and brains of birds with beriberi show a decrease in their nucleic acid content, more marked in the liver than in the brain.

" (5) The administration of vitamine B to a bird suffering from beriberi is followed by :—(a) the removal of the lipoid from the adrenal cortex ; (b) an increase in the nucleic acid content of the brain ; (c) the reappearance of the Nissl granules ; (d) the disappearance of the paralytic symptoms.

" (6) Vitamine B is an essential factor in the synthesis of animal nucleic acid by the body."

P. W. B-S.

FINDLAY (George Marshall). **Glyoxalase in Avian Beriberi.**—*Biochem. Jl.* 1921. Vol. 15. No. 1. pp. 104-106.

The experiments were carried out in order to investigate the carbohydrate metabolism in avian beriberi. Glyoxalase, as pointed out by DAKIN and DUDLEY, is an enzyme with an important rôle in the metabolism of sugar ; it is widely distributed in the tissue, and has the power of transforming "glyoxals" into compounds of lactic acid. Estimations were made of the glyoxalate content of the livers in control pigeons, in pigeons suffering from beriberi, and in pigeons cured of beriberi by the means of administration of vitamine B. The conclusions arrived at were : (1) The glyoxalase content of the liver in pigeons with beriberi is less than in the control pigeons ; (2) the administration of vitamine B to a beriberi pigeon is followed by an increase in the glyoxalase content of the liver ; (3) vitamine B does not act as a co-enzyme of glyoxalase.

P. W. B-S.

SCURVY.

WALKER (P. H.). **Scurvy**.—*S. African Med. Rec.* 1921. Apr. 9. Vol. 19. No. 7. pp. 128-130.

Last year the author drew the attention of the health authorities to the presence of scurvy amongst natives returned from the mines, but nothing was done. He states that in the first 14 days of the present year he saw 19 cases, generally of a mild type, which could definitely be attributed to a diet deficient in anti-scorbutic factors.

Among the natives, marewu, a sour meal gruel, is looked upon as a preventive, but the author points out that it has neither prophylactic nor curative value, and in practice he forbids sour drinks of any sort. He points out that as the employee is penalized for becoming sick, cases in the early stages of scurvy rarely come for treatment.

P. W. Bassett-Smith.

AIKMAN (John). **Infantile Scurvy**.—*Arch. of Pediatrics.* 1921. Jan. Vol. 38. No. 1. pp. 41-51.

The author describes, with illustrative cases, the symptoms of latent, mild and severe scurvy in infants, and shows that the cause is in most cases the prolonged use of condensed, boiled and pasteurized milk, with often some much-lauded proprietary food; all of which are practically free from anti-scurvy vitamins. It is true that surrounding unhygienic conditions favour the development of symptoms, but these in themselves are not the cause. In his experience the symptoms very rapidly clear up when orange juice or canned tomato juice are added to the diet [much more rapidly than, in the reviewer's experiments, is found to take place in guinea-pigs. The paper is very interesting, and will be found useful to those dealing with children's diseases. We should not lose sight of the fact that the advantage gained for general health by pasteurizing milk far outweighs the slight loss of vitamins, which can be easily supplied by means of orange juice].

P. W. B-S.

GIVENS (Maurice H.) & McCLUGAGE (Harry B.). **The Effect of Heat and Age upon the Anti-Scorbutic Vitamine in Tomatoes**.—*Proc. Soc. Experim. Biol. & Med.* 1921. Feb. 16. Vol. 18. No. 5. p. 164.

The authors have previously shown that tomatoes are efficient anti-scorbutics, and that they can be heated to 56° to 60° C. for 14-24 hours, or for 35-40 hours at a temperature of 36-44° C., and still retain much of their vitamins, and that these persist for three months. HESS has demonstrated that for children and guinea-pigs canned tomatoes are efficient for a year. Further experiments with guinea-pigs were carried out, and it was found that they were protected by daily doses of 2.5 gm. of fresh tomatoes, by 10 gm. of fresh tomatoes heated for one hour at 100° C., by 2 gm. of dried tomatoes heated for 15 minutes at 100° C., by 10 gm. of canned tomatoes at 15 lb. pressure for 30 minutes, by 3 cc. of commercial-canned tomatoes three years' old, and by 10 gm. of the same cooked for 15 minutes at 100° C.

P. W. B-S.

GIVENS (Maurice H.), McCLUGAGE (H. B.) & VAN HORNE (E. G.).
The Anti-Scorbutic Property of Raw, Dried, and Cooked Apples and Bananas.—*Proc. Soc. Experim. Biol. & Med.* 1921. Feb. 16. Vol. 18. No. 5. pp. 140-141.

As apples and bananas are being commonly used and generally classed as anti-scorbutics, it was considered important to determine quantitatively their efficiency in the raw state and after heating, when preserved or cooked. Experiments with guinea-pigs on an adequate basal diet free from anti-scurvy vitamins showed that 10 gm. of raw apples or bananas per diem will protect for three months. An equivalent of these foods cooked at 100° C. for 15 minutes, or dried at 55-60° C. and cooked for 15 minutes at 100° C., will not protect animals, though apples retain a slight amount of anti-scorbutic power after being treated by these methods.

P. W. B-S.

LAMER (V. K.), CAMPBELL (H. L.) & SHERMAN (H. C.). **The Effect of Temperature and of Hydrogen Ion Concentration upon the Rate of Destruction of Anti-Scorbutic Vitamine.**—*Proc. Soc. Experim. Biol. & Med.* 1921. Jan. 12. Vol. 18. No. 4. pp. 122-123.

This is a preliminary report of some experiments carried out by the authors. Guinea-pigs of 300 gm. were fed on a rich but scorbutic diet. Filtered tinned tomato juice was alone used for the supply of the vitamins; boiling this for one hour destroyed practically 50 per cent. and for four hours 70 per cent. of the anti-scorbutic vitamine present. Neutralization of a large portion of the natural acidity regularly increased the rate of destruction of the vitamine at 100°. Neutralizing, then heating, and re-acidifying increased the destruction to 65 per cent. When alkali was added to an initial P_H of 11, and the juice then heated for one hour and stored for five days in a refrigerator, the destruction was as high as 90-95 per cent.

P. W. B-S.

DAVEY (Alice Jane). **Determination of the Minimum Doses of some Fresh Citrus Fruit Juices which will Protect a Guinea-Pig from Scurvy, together with some Observations on the Preservation of such Juices.**—*Biochem. Jl.* 1921. Vol. 15. No. 1. pp. 83-103.

The work was done at the Lister Institute under the direction of Dr. Harriet CHICK, and includes experiments to preserve fruit juices for considerable periods so as to retain their anti-scorbutic properties as long as possible. All the experiments were carried out on young growing guinea-pigs fed on a basal diet of oats and bran, to which was added 60-90 cc. of autoclaved milk. The excess of acids in the fruit juices was neutralized with sodium carbonate a short time before these were given, and it was believed that no appreciable change in the anti-scorbutic value of the ration was caused. The previous work showing the inferiority of lime juice was confirmed. The minimum daily dose required to protect a guinea-pig from scurvy was found to be lemon 1.5 cc., orange 1.5 cc., lime 5.0 cc.

If sulphite (potassium metabisulphite) was used as a preservative, the fluid kept well at 0° C., but at room temperature the results were uncertain, and at 37° C. it became useless and the juice went bad.

[This was also the experience of the reviewer with samples of lemon juice preserved with sulphite, sent from Messina.] If the rind oil of lemons was used as the preservative similar results at 37° C. were obtained, though the juice was not as unpalatable as was the juice preserved with sulphite. At room temperature (17° C.) the rind oil appeared to give satisfactory results, even after two years' storage. It was not found possible by any method to preserve the juice so that it would retain its efficiency at 37° C. Oranges and lemons, if kept in the cold, but not frozen, appeared not to lose materially their anti-scorbutic property. The details of the work are given and are of much interest. The minced whole lemons containing both juice and natural rind oil gave a product which apparently kept well at room temperature and retained its efficiency, and it is suggested that it is the most reliable.

[The disadvantage of the oil-preserved juice for ship work would be that in the tropics it could not be depended upon; a sample from the Mediterranean containing rind oil gave no protection, even in 4 cc. doses, to guinea-pigs when tested in the laboratory at Greenwich.]

P. W. B-S.

HUME (Eleanor Margaret). **Investigation of the Anti-Scorbutic Value of Full Cream Sweetened Condensed Milk by Experiments with Monkeys.**—*Biochem. Jl.* 1921. Vol. 15. No. 1. pp. 163-166.

In unsweetened condensed milk which is heated to a temperature above 100° C. to sterilize it, probably all the vitamins are destroyed, but this is not the case with sweetened condensed milk which depends on a high concentration of sugar to preserve it after preliminary pasteurization and condensation at a temperature of 55° C. *in vacuo*. Nestlé's brand was employed in the experiments, and two monkeys. The basal diet consisted of boiled white rice and wheat germ. One monkey had remained in health on a ration of 200 cc. of raw milk daily for 225 days, while the other, on a ration of dried milk, developed scurvy after 77 days; he was then cured with 200 cc. of raw milk, just scalded, given daily. In the course of the present experiments the animals increased in weight from 2-3 kilos to 5 and 4.5 kilos. In the first experiment both animals received an equivalent of 250 cc. of fresh milk daily and remained in perfect health the whole time. In the second experiment one received an equivalent of 200 cc. of fresh milk for 260 days; it remained in good health, but growth was slower than in the first experiment. The second animal received the equivalent of 150 cc. of fresh milk, together with 50 cc. of the same milk autoclaved at 120° C. for one hour; this destroyed the anti-scorbutic vitamin, but made the vitamin A value equal to the first. This animal only gained half the weight of the first animal on the same vitamin A ration, though it appeared to be in perfect health. The non-destruction of the vitamins in the condensation of the Nestlé's sweetened condensed milk is due to the heating being done *in vacuo* (with less oxidation). It is noted that the milk used was diluted at most four times, whereas instructions for the use of the milk for infants suggests a dilution of at least eight times. So large an addition of water produces a dilution of the fat and vitamins to an extent likely to be dangerous, although the high percentage of sugar gives an adequate calorie supply.

P. W. B-S.

JEPHCOTT (Harry) & BACHARACH (Alfred Louis). **The Anti-Scorbutic Value of Dried Milk.**—*Biochem. Jl.* 1921. Vol. 15. No. 1. pp. 129-139. With charts and tables.

Healthy young guinea-pigs of about 300 gm. were used for the experiments. As these animals are not normally in the habit of taking fluids beyond that contained in their food, any undue dilution of the milk powder was avoided by making the powder into a thin cream *with three times its weight of hot water*, that is, twice as concentrated as that used by BARNES and HUME. The milk was freshly made up for each feed and was given warm. There were in these experiments considerable differences in results from those obtained by other workers; this, the authors think, may be explained by the difference in weights of the animals and quantity of milk taken. They found that on the average, growing guinea-pigs obtained as much protection from reconstituted dried milk as BARNES and HUME found to be afforded by raw milk [see this *Bulletin*, Vol. 15, p. 31]; the minimum protective dose of reconstituted milk for a guinea-pig of 400 gm. body-weight was 110 cc. The milk to which alkali had been added (neutralized milk) lost some of its anti-scorbutic value, but with this in no case did scurvy symptoms appear in less than 100 days where rather less than the average quantity of raw milk required for protection was used. In the roller process the milk was only subjected to high temperature and oxidation for two and a half minutes. For infant feeding, milk dried by this process and stored in air-tight vessels contains sufficient anti-scorbutic accessory food factors to prevent scurvy when used alone. The following summary is given by the authors:—

Summary.—"Animals have been fed upon summer milk, winter milk, and neutralised milk dried by a roller process, and upon milk dried by the spray process. In the case of the summer and winter milks the anti-scorbutic values were found to be about equal to one another and to those of the original raw milks. The neutralised milk had an anti-scorbutic value slightly less than that of the raw milk, and the spray process dried milk was markedly deficient in anti-scorbutic value.

"Of the summer and winter dried milk a daily dose of 26 cc. per 100 grams body weight of reconstituted milk was, on the average, sufficient to afford protection against scurvy in the guinea-pig"

P. W. B-S.

DUTCHER (R. Adams), ECKLES (C. H.), DAHLE (C. D.), MEAD (S. W.) & SCHAEFER (O. G.). **Vitamine Studies. VI. The Influence of Diet of the Cow upon the Nutritive and Anti-Scorbutic Properties of Cow's Milk.**—*Jl. Biol. Chem.* 1920. Dec. Vol. 45. No. 1. pp. 119-132. With 5 charts.

By guinea-pig experiments it was shown that cows' milk obtained in the winter from animals which were on a vitamine-poor ration was deficient in accessory bodies, as compared with the milk obtained from the same cows in the summer, the vitamine contents of the cow's milk being dependent upon the vitamine content of the cow's ration. 20 cc. of summer milk was found to be superior to 60 cc. of winter milk. They also found that when the cows were on the vitamine-deficient diet the loss of vitamine in the milk took place slowly, whereas recovery of the nutritive and vitamine value was very rapid on the animals receiving a vitamine rich diet.

P. W. B-S.

HESS (Alfred F.) & UNGER (Lester J.). **The Destructive Effect of Oxidation on Anti-Scorbutic Vitamine.**—*Proc. Soc. Experim. Biol. & Med.* 1921. Feb. 16. Vol. 18. No. 5. p. 143.

To a litre of raw milk is added 4 cc. of normal solution of hydrogen peroxide; if this be placed in an incubator overnight, bacteria do not develop. When guinea-pigs on a basal diet of oats received 80 cc. of this milk per diem, all developed scurvy in 2-4 weeks, just as severe as when given autoclaved milk; the addition of fresh orange juice served either to protect or to cure them. Orange juice subjected to oxidation for a short time also lost some of its power, and previously it has been shown that milk and tomato juice which had been shaken (oxidized) lost some of their vitamines. The harmful effect of ageing may also be due to oxidation. This action probably explains the differences in the anti-scorbutic potency of foodstuffs which have been treated in apparently similar ways, for example, of milk which has been heated in open pans or in hermetically sealed bottles.

P. W. B-S.

ZILVA (S. S.). **The Influence of Aeration on the Stability of the Anti-Scorbutic Factor.**—*Lancet.* 1921. Mar. 5. p. 478.

The author's experiments on guinea-pigs demonstrate the interesting facts that ozone inactivates the anti-scorbutic and fat-soluble vitamines, that bubbling air through an anti-scorbutic solution at ordinary temperature inactivates this, and if air is passed through while the fluid is boiled for an hour almost the entire activity is lost; whereas if this is done in an atmosphere of CO₂, there is no marked diminution. The minimum dose of de-acidified lemon juice for a guinea-pig is 1.5 to 2 cc.; when treated by aeration in this way at room temperature in air, even 5 cc. did not prevent scurvy symptoms, and 7 cc. was found insufficient to promote normal growth. Boiling in ordinary air and CO₂ gave results as stated above. The action of heat and aeration on the water-soluble vitamines gave rise to very little change, and these seem to be much more stable to oxidation.

P. W. B-S.

MOURIQUAND (G.) & MICHEL (P.). **Les états scorbutiques passagers et récidivants.**—*C.R. Soc. Biol.* 1921. Apr. 23. Vol. 84. No. 14. pp. 734-735.

In general, animals which have developed experimental scurvy die unless the deficiency foods are again supplied. In an experiment it was found that by combining a daily dose of 10 cc. of lemon juice, sterilized at 120° C. for one and a half hours, with the deficiency diet a guinea-pig had gained weight on the 107th day from 350 to 525 gm., but it showed marked signs of scurvy; these signs gradually passed away, and on the 174th day the animal was quite well and weighed 570 gm. In a second experiment, when 5 cc. only were used, the animal developed scurvy on the 87th day, but finally without change of diet completely recovered. From this the authors concluded that with a minimum of anti-scorbutic substances there is a certain period when symptoms appear, but that the organism is able spontaneously to regulate its consumption so that a kind of tolerance is established; the nutrition, however, remains in a state of unstable equilibrium.

The same is seen clinically in human cases, on an incomplete anti-scurvy diet, when the pre-scurvy signs of anaemia and asthenia, with or without paresis, are present and may disappear spontaneously. Transient and relapsing scorbutic symptoms are thus explained.

P. W. B-S.

MOURIQUAND (G.) & MICHEL (P.). **Scorbut expérimental et inanition.**—*C.R. Soc. Biol.* 1921. Apr. 23. Vol. 84. No. 14. pp. 735-737.

The authors insist on the importance of recognizing that the so-called deficiency diseases differ from inanition, and are dependent upon something more than an absence of vitamines, which is only a partial cause, and that inanition and scurvy are absolutely distinct.

Guinea-pigs become scorbutic about the 21st day on a diet of oats and hay, and scurvy may be present without loss of weight, or the animals may even show a gain in weight; that is, they give no evidence of inanition. With a diet of oats only, loss of weight is more marked, which is probably due to the hay, though deprived of its anti-scorbutic properties, containing substances which are missing in the oats. On the other hand, an insufficient normal diet causes death by inanition, with great loss of weight about the 16th day, when the anatomical and clinical lesions of scurvy are entirely absent, even if death has been delayed to the 28th day. In children scurvy or pre-scurvy signs may become manifest when the caloric value of the food is equal to or above the necessary, but there is a relative or complete absence of fresh and "living" food.

P. W. B-S.

WILKINSON (A. Norris). **Scurvy in a Breast-fed Infant.** [Correspondence.]—*Brit. Med. Jl.* 1921. Apr. 16. p. 583.

Reports a case of scurvy in an infant only a few months' old, which had been purely breast fed. The mother had been living on little else than bread, pickles and vinegar. The mother's diet was altered and orange juice given, and the child rapidly recovered. The correspondent has brought this case forward, as HESS states that breast-fed children do not contract scurvy. [No rule in medicine is without an exception.]

P. W. B-S.

SHEASBY (Herbert). **Swelling of the Pinna—an Early Sign of Deficient Anti-Scorbutic Vitamine.**—*Practitioner.* 1921. Mar. Vol. 106. No. 3. (No. 633.) pp. 215-216.

About 30 cases of early scurvy, which showed a peculiar swelling of the ear, were seen in an internment camp for prisoners. In 24 of the cases only one ear was affected, and in most the swelling was in the upper half of the left pinna, the skin was reddened, but there was no pitting on pressure nor ecchymosis. The only other signs of scurvy were progressive weakness and pallor. The disease was put down to overcooking of the food and a complete absence of potatoes for a fortnight, the local lesion to the use of very hard pillows.

P. W. B-S.

TUBERCULOSIS IN THE TROPICS.

CUMMINGS (S. Lyle). **Tuberculosis in Primitive Tribes and its Bearing on the Tuberculosis of Civilized Communities.**—*Internat. Jl. Public Health.* 1920. Sept. Vol. 1. No. 2. pp. 137-171
With 6 charts.

The first part of this extremely interesting paper is occupied with some quotations and illustrations of the familiar facts that among communities shut off from all intercourse with the great world tuberculosis is non-existent or rare, but that when members of such communities come in touch with civilization they then exhibit an extreme susceptibility to tuberculosis of a particularly acute kind.

This susceptibility of "virgin soil," together with the low percentage of tuberculin reactions observed among certain primitive tribes who have been submitted to von Pirquet's test, is inferred to be a proof of the absence or rarity of the tubercle bacillus, and also—which is not so obvious from the nature of the evidence offered—of the non-existence of any degrees of inherent individual susceptibility, in the circumstances of isolation.

Contrasted with this flaring tuberculosis of virgin soil, which is assumed to be wholly due to lack of antigenetic resistance, is the more smouldering tuberculosis of a civilized society so often breaking out in individuals supposed to be marked down by some inherent predisposition to infection. The author examines this question of inherent vulnerability or hereditary predisposition, and suggests that this hypothetical heritage is better explained as individual "absence of acquired resistance."

This suggestion is developed as a "theory of infection and resistance" which assumes that the infant generations of ordinary tuberculized (or civilized) communities are, like the members of isolated primitive communities, highly susceptible to tuberculosis, and that sooner or later they are exposed to the communal infection; if, as in an infected home, the young child becomes dangerously infected at the outset, being "virgin soil" it has no opportunity of acquiring resistance, but in ordinary circumstances, where contact with infection is delayed and minimized or limited, some resistance is gradually acquired, and with advancing age ultimately becomes sufficiently protective to modify the pathological effects of a dangerous infection.

That early infection must be a common phenomenon in civilized communities, and that infection in very young children is of the unmitigated virgin soil type, but that its effects tend to become modified or localized more and more with advance in years, are points held to be established by certain post mortem statistics and observations of tuberculin reactions. And the argument that effective resistance of the kind postulated can be acquired by the individual is supported by experiments, here quoted, which show that when a laboratory animal previously "sensitized" by vaccination is infected with virulent bacilli the ultimate pathological effects are greatly modified and mitigated.

The hypothesis thus formulates two phases in the varied phenomena of tuberculosis of civilized (*i.e.*, tuberculized) communities, namely a "pre-infective" phase, where dangerous infection finds virgin soil and is unopposed by any resistance, and a "post-infective" phase, where the soil has been "sensitized" by mild contact with infection

and an unstable equilibrium between infection and resistance has gradually come about which, of course, may be profoundly disturbed by circumstances favouring infection.

How the individuals of a tuberculized community acquire this partial and precarious immunity is suggested rather than declared: it might begin with ingestion of bovine bacilli in milk, and might be augmented by contact with small casual doses of human bacilli in schools, play-rooms, etc. This would carry a majority of the population safely over the "young adult" period of acute tuberculosis. But as the young adults go out into the world, and come more and more exposed to human infection, the balance between infection and resistance may become upset, and the chronic tuberculosis of "middle age" may be the result. The "old age type" of tuberculosis appears to be associated with some particular occupation and tends then to occur in places where the "young adult type" is met with.

This is a bare outline of the author's most interesting and well-reasoned argument, as the reviewer understands it, and nothing is here said of the applications of the theory to BROWNLEE's epidemiological generalizations, for the reason that the author himself expresses some diffidence in making his interpretations.

It is not supposed that this theory explains everything, or that the play of infection and resistance is not modified by external circumstances, meteorological, physiological, etc.

[Why the author should consider a theory of hereditary vulnerability to be in conflict with the theory of infection and resistance, rather than complementary to it, is not obvious, since the former theory need not assume anything more than an inherited physiological hesitation or reluctance to produce cytases or sensibilizing bodies in response to antigens. Even among isolated tribes some individuals may reasonably be assumed to be more, or less, susceptible than others.]

A. Alcock.

MOREAU (L.). **Fréquence de la tuberculose pulmonaire chez les représentants des races colorées importés en France. Observations radiologiques.**—*Bull. Acad. Méd.* 1919. Feb. 25. Vol. 81. No. 8 pp 224-226.

This paper contains an interesting description of the results of radiological examination of numbers of coloured troops and labour units brought to France for service during the war and showing signs of tuberculosis infection. Special attention is called to the frequency with which are found great enlargement of the glands of the hilus, especially on the right side; the opacities so caused having clear-cut outlines like those resulting from a dermoid cyst. At the apices of the lungs an obscurity only is noticed, with complete absence of illumination on coughing. This is taken to indicate parenchymatous infiltration. In some cases, appearances recalling those familiar in European phthisis were noted. The author concludes that these coloured races are very liable to tuberculosis; that the type is difficult to recognize by ordinary clinical examination since the general health seems to remain fairly good for a considerable time; and that the peculiar susceptibility manifested is to be attributed to the unfamiliar climatic conditions, to physical fatigue, modification of diet, etc. He considers that a routine X-ray examination before embarkation might have brought to light many of these cases. [This view is not

quite in line with the findings of BORREL in newly-arrived Senegalese troops, in which only about 4 per cent. of the men gave positive reactions to the von Pirquet test (see this *Bulletin*, Vol. 16, p. 191). It is at least possible that many of the infections noted by Moreau had been acquired after arrival in France.]

S. Lyle Cummins.

ROUBIER (Ch.). **Les formes cliniques de la tuberculose thoracique chez les troupes exotiques importées en France pendant la guerre.**—*Gaz. des Hôpitaux*. 1920. Oct. 2. Vol. 93. No. 84. pp. 1333-1339.

Students of tuberculosis owe a debt of gratitude to the admirable work of the officers attached to the French Army Medical Service in their studies of this disease as it affected their Colonial troops and labour units during the late war. In the *Annales de l'Institut Pasteur* of March, 1920, A. BORREL placed on record, in his paper on the tuberculosis of Senegalese soldiers serving in France, one of the most significant series of observations that have yet been made upon the subject of tuberculosis in "virgin soil" [see this *Bulletin*, Vol. 16, p. 190]. In the article now under review Dr. Roubier adds a further contribution of the highest value. His material is arranged under three headings:—

1. Etiological considerations on the tuberculosis of natives of the French Colonies in their own countries.

2. The tuberculosis of these natives during their service in France.

3. Pathogenesis of tuberculosis. An attempt to explain the anatomoclinical variations of tuberculosis in different races.

Of the first heading little need here be said since the findings of Roubier correspond closely to those of BUSHNELL, whose work "A Study in the Epidemiology of Tuberculosis, with Especial Reference to Tuberculosis of the Tropics and of the Negro Race," was recently reviewed in this *Bulletin* [Vol. 17, p. 90]. The questions raised under the second and third headings are of fundamental importance, and require to be considered at some length. In general terms, the observations of Roubier lead him to lay great stress on the *insidious* character of tuberculosis in these Colonial patients. While asserting once more the extreme susceptibility of these men to the disease, he points out that they may be very heavily infected and yet show at first hardly any clinical signs or, indeed, any marked depreciation in health. At this stage radioscopic examination gives a clue to the rapid though masked progress of the disease. The author quotes from the radiological observations of MOREAU [see above], who showed that, in many patients as yet comparatively free from the ordinary clinical signs of the disease, the screen demonstrated the existence of great hypertrophy of the glands at the root of the lungs, more especially on the right side, forming opacities with distinct outlines resembling those seen in cases of dermoid cysts. In other cases nothing is seen but an opacity at the apices, tending to show no diminution on coughing and indicating a parenchymatous infiltration of the lung substance. From these and similar observations Roubier concludes that these Colonial soldiers may be "very gravely infected with tuberculosis in spite of a prolonged absence of clinical signs and a relative retention of good general health." This applies to all the races that contributed to form the French Colonial units. Sooner or later, however, the disease departs from its latent and insidious character, takes on a generalized type, and leads rapidly to a fatal issue.

After these general considerations the author turns to the points of difference that were noted between the various races observed. The races appear to fall into three groups in their response to tuberculosis infection:—

1. Those that have had considerable contact with Europeans in their original surroundings, such as the Algero-Moroccan troops. While evincing considerable susceptibility, these troops showed a clinical picture comparable in every essential character with that of European tuberculosis.

2. Those who come from remote and sparsely-populated areas, where there is little contact with civilization. Examples of this type are afforded by the Senegalese and Malagasy levies. These men react to tubercular infection in a manner quite dissimilar to the adults of Europe. In the words of BOKREL, this tuberculosis is "la tuberculose de l'enfant ou du singe ou du cobaye." The points most worthy of notice are the early infection and enlargement of the glands at the roots of the lungs; the tendency to a glandular enlargement palpable in the subclavicular area, a sign that came to be looked for as a characteristic by the French Army surgeons; a dulling of the gloss that is so noticeable in the healthy negro skin; and, finally, a diffuse parenchymatous infiltration of the lung tissue. A fact worthy of remark is the rarity of tubercle bacilli in the sputum. In a total of 2,300 cases of "suspected" bronchitis of various races, of whom the sputum was examined, the proportion of "positive" specimens was 14 to 15 per cent., whereas in 55 Senegalese "suspects" only one sputum showed tubercle bacilli, or a proportion of 1.85 per cent. A moment's thought will suffice to show how closely comparable is this picture to the tuberculosis of the European infant, and how markedly different from that of the European adult.

3. Those races which, while remote from contact with European civilization, include relatively large agglomerations in their native townships. Such are the inhabitants of Indo-China, and their tuberculous response, while that of a highly susceptible race, is not quite the same as the response of the Senegalese subjects. Here the glandular hypertrophy is much less evident. The chief focus of the infection is on the bones and serous membranes. The evolution of the disease is slow, but accompanied by a marked tendency to generalization. Pulmonary lesions are not important, and are usually secondary. The picture recalls that of the tuberculosis of the European half-grown child rather than that of the infant on the one hand or the adult on the other.

In his attempt to explain these differences in racial reaction to tuberculous infection, Roubier discusses the possible influence of such factors as antecedent malaria or co-existent syphilis, only to dismiss them as relatively unimportant. He finds, in the presence or absence of previous contact with the tubercle bacillus, the most probable explanation of variation in clinical type. The Algero-Moroccans differ but little from the Europeans, because they have had previous tuberculous contact on a considerable scale in their own country. The Senegalese, being "virgin soil," behave like the European infant when exposed to massive infection. The Indo-Chinese, also considerably free from previous contact, appear to react like European children of slightly older "age-group," while the Malagasies conform to the Senegalese or the Moroccan types according to whether they have been recruited from the tuberculous or the non-tuberculous districts of Madagascar.

S. L. C.

CARBONELL (Manuel V.). **Contribución al estudio de la epidemiología de la tuberculosis en la República Argentina.** [A Contribution to the Epidemiology of Tuberculosis in the Argentine Republic.]—*Rev. Inst. Bacteriolog.* 1920. May. Vol. 2. No. 5. pp. 653-658. With 5 charts.

In a general consideration of the mortality from pulmonary tuberculosis throughout the cities of the modern world, the author divides localities in three main groups and a fourth subsidiary group as follows :—

- (a) Those showing, in recent years, a marked diminution in tuberculous mortality to a low level.
- (b) Those showing a marked diminution but still maintaining a high level of mortality.
- (c) Those with a slight diminution only but still maintaining a high level of mortality.

A fourth group, in which Bucharest, Odessa, Nice, Breslau, Athens and Genoa are included, shows a rise in mortality instead of a drop. Carbonell points out that it is to this last group that Buenos Aires belongs, and that the same is true of the whole Argentine Republic. Since 1912 there has been a well-marked upward tendency in the curve of the tuberculous mortality in these regions. In diagrams II and III are charted the population, the general death-rate, the tuberculous death-rate, and the death-rate from infectious diseases for Buenos Aires and for the Argentine Republic ; and curves showing the ratio of tuberculous mortality per 1,000 of all deaths and per 1,000 of the total population are given in diagrams IV and V. These statistics bring out the interesting fact that a well-marked increase in the tuberculous death-rate coexists with a decided drop in the general death-rate and a diminution in the mortality from infectious diseases. Point is given to these observations by the statement that the majority of deaths in adult life fall between the ages of 15 and 35 years. Dr. Carbonell will find in Special Report Series, No. 46, of the Medical Research Council, p. 67, that a similar want of correlation between the tuberculous death-rate and the general death-rate has been shown by J. BROWNLEE to obtain in the British Isles in so far as concerns the " young adult " type of mortality, though in the " middle age " type of tuberculous death-rate the curve follows that of the deaths from all causes.

These facts appear to be the expression of a law in the epidemiology of tuberculosis. The " young adult " variety of death-rate denotes the prevalence of an acute and rapidly fatal clinical type of the disease, which appears to obey laws of its own, and to be relatively little affected by the influence that determines death from other causes. It is this type of tuberculosis that is met with, especially, in those localities in which there is a migration of people from country districts into growing towns and a reverse current of infected persons from the towns to die in their village homes. It is a matter of great interest to find that, in a country like the Argentine, where a progressive medical policy is successfully reducing the death-rate from infectious diseases, acute pulmonary tuberculosis still defies general measures of hygiene.

The author advises a more intense social campaign in the prevention of tuberculosis, and invokes better housing and better disinfection. While in agreement with this advice we venture to hazard a guess that in the Argentine Republic, as elsewhere, the upward curve of tuberculous mortality will cease and be followed by a steady diminution as

soon as the process of urbanization stabilizes and the population acquires for itself the relative immunity that exists in the older communities of Europe.

S. L. C.

WIEBERDINK (Tj.). [In Dutch and English.] **Over chirurgische tuberculose en sporotrichose der inlanders.—On Surgical Tuberculosis and Sporotrichosis among Natives** [of Java].—*Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië*. 1920. Deel 2. pp. 28-35.

There is a belief among medical men in the Dutch Indies that "surgical tuberculosis," especially that of joints and bones, does not occur among natives. The author, therefore, collected the cases seen by him in the town hospital at Batavia during the last four years.

They are tabulated thus:—

Tuberculosis of the glands . .	16		
		{ Rib . .	1
		{ Spine . .	7
Tuberculosis of the bones . .	11	{ Olecranon	1
		{ Tarsus . .	1
		{ Carpus . .	1
		{ Hip . .	3
			{ 1 primary.
			{ 2 due to trochanter
			tuberculosis.
Tuberculosis of the joints . .	6	{ Shoulder	1
		{ Knee . .	2
			{ femoral focus.
			{ tibial focus.
Total	33		

Cases of tuberculosis of the epididymis, uterus and kidney, as well as of bone, in the practice of other surgeons are mentioned, giving a grand total of 42 cases of surgical tuberculosis. Where possible, microscopical examination was always made, and in cases of tuberculosis of the bones or joints X-ray photographs were taken.

The author calls attention to an article by TEN BRINK on sporotrichosis in the Dutch Indies [see this *Bulletin*, Vol. 9, p. 53], and notes that this writer did not prove the pathogenicity of his cultures by inoculation into animals. In the last four years Wieberdink has systematically searched for a case of sporotrichosis among more than 16,000 patients, and has failed to find one. Where the diagnosis has lain between sporotrichosis and syphilis, mercury has always proved curative, which puts sporotrichosis out of court. He believes, therefore, that TEN BRINK's fungi were not pathogenic.

He concludes that surgical tuberculosis is not a rare disease among the natives of Java, and that the occurrence of sporotrichosis among them is unproven.

A. G. B.

ROST (E. R.). **Preliminary Note on the Treatment of Tubercular Affections of the Enclosed Cavities, Abscesses, and Caries, by Inflation with Oxygen.**—*Indian Med. Gaz.* 1920. Sept. Vol. 55. No. 9. pp. 329-332. With 1 illustration.

The author here describes the treatment of four cases of psoas abscess, one of tubercular peritonitis, and three of tubercular joints, by inflation with oxygen with "remarkable" results. Details of the method are

given. In the case of a joint, distention persists for about 10 days, pain is relieved, and only one application is necessary, recovery taking place with no limitation of movement. Of the case of tubercular peritonitis the account is similar. The patient was blown up twice and was marvellously improved. The treatment is very easy, the author writes, and is inexpensive.

A. G. B.

NOC (F.) & ESQUIER (A.). **Tuberculose de la voûte du crâne chez un noir du Soudan.**—*Bull. Soc. Path. Exot.* 1920. May 12. Vol. 13. No. 5. pp. 330-331.

A native seaman had two cold abscesses on his head containing sero-purulent fluid, and a suppurating gland under the jaw. The Wassermann reaction was found on two occasions to be positive. The diagnosis was established by the inoculation of a guinea-pig, which died two months later of generalized tuberculosis.

A. G. B.

D'ALMEIDA (Lourenço).—Sobre a Tuberculose Pulmonar em Goa.—*Bol. Ger. Med. e Farmacia.* Nova-Goa 1919. Oct. Vol. 5. No. 10. pp. 363-368.

The author states that pulmonary tuberculosis is becoming steadily more prevalent in Goa. No statistics are given and the paper is of little general interest.

F. S. Arnold

DUBLET (F.). **Cas de guérison de la Tuberculose expérimentale.**—*C.R. Soc. Biol.* 1921. Jan. 22. Vol. 84. No. 3. pp. 111-112.

The author states that guinea-pigs injected with an extract of the digestive gland of edible snail mixed with an extract of caterpillar of the meal-moth are perfectly resistant to a subsequent inoculation with phthisical sputa rich in tubercle bacilli. As the mixture of these extracts did not kill tubercle bacilli in cultures, the author infers that it must have acted in the living animal by increasing the humoral reactions.

The author was led to make these experiments by deduction from the premises that the protective coat of the tubercle bacillus contains fatty and cellulose elements; that the body of the caterpillar of the bee-moth [a *Microlepidopteron* closely related to one of the meal-moths] contains a lipolytic ferment; and that the digestive gland of the edible snail contains a diastase similar in action to that of carobs, as well as a lipolytic ferment. The extract of snail gland was made by braying the glands in excess of lime-water, adding glycerine and filtering. The extract of caterpillar is described simply as a glycerine extract.

Guinea-pigs inoculated by the author with tubercle bacilli after receiving a four to eight weeks' course of subcutaneous injections of the mixed extracts do not show any signs of infection, while all the control guinea-pigs are infected *à coup sûr*.

The author states modestly that he thinks his experiments are worth relating.

A. A.

TROPICAL DISEASES BUREAU.

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RECENT ADVANCES IN THE KNOWLEDGE OF CHOLERA.

By Lt.-Col. J. H. TULL WALSH, F.L.S., F.Z.S., I.M.S. (retd.).

Sectional Editor, Tropical Diseases Bureau.

The Managing Committee of the Tropical Diseases Bureau having called upon Sectional Editors for critical summaries of progress in our knowledge of the various diseases dealt with in the *Tropical Diseases Bulletin*, I have thought the occasion favourable for including a review of the work done by the Medical Officers attached to the Ministry of Health.* Their work covers certain years of the Great War, and leads naturally on to my critical summary. Their grasp is wide and includes, for cholera, the World.

In India, the home of cholera infection, the disease has become less prevalent. This is due in the main to improved sources of water supply, sanitary arrangements for religious fairs and pilgrimages, including shelter for travelling pilgrims, good food, good water, latrines and burning ghats, with guards to prevent bodies being thrown into the rivers. The cholera death-rate in the British districts of India was 1.18 per 1,000 of population in 1914, and remained low, being 1.12 for 1917. The total deaths, 1914-17 (inclusive), were 1,240,251. Figures for native states were not available. As regards monthly incidence during 1914-17, there is little calling for notice, but, speaking generally, the months, October, November, and December showed most sickness, with a distinct fall in January, February, and again a slight rise in March. Of the four years, three give an almost equal number of deaths (about 260,000), while 1915 was a bad year, showing 404,472 deaths. During that year Dacca district was swept by an epidemic and 52,452 persons died. In 1916 the deaths in Bengal fell to 70,836, the lowest record since the constitution of that Presidency in 1912. There does not appear to be much difference in the death rate for males and females; riparian wards of cities suffer most, and this is especially noticeable among Hindus. As compared with Bengal, Bihar, Bombay and Madras, the Presidencies further north show a lower death rate, and it is instructive to note that in the North-West Frontier Province "there were no deaths from

* MINISTRY OF HEALTH, Reports on Public Health and Medical Subjects, No. 3. The Progress and Diffusion of Plague, Cholera and Yellow Fever throughout the World, 1914-17. By R. Bruce Low, with an Introduction by Sir George NEWMAN. 1920. London: H.M. Stationery Office. [Price 7/6 net.]

cholera in 1917." In 1914 the death rate per 1,000 of population was 1.13, sinking to 0.09 in 1916. The inhabitants are mostly Mahomedans. Burma, with its Buddhist people, also shows comparative freedom from cholera epidemics and the Sanitary Commissioner for Burma reports that "the prevalence of cholera is generally associated with the use of polluted water drawn from unprotected sources." "Towns are being provided with safer supplies." In Rangoon the disease is practically limited to that portion of the town to which the piped water supply has not yet been extended. The cholera death rate for Burma was exceptionally high in 1915 [cf. Bengal, etc.] viz., 1.79 per 1,000 as against 0.41 per 1,000 for five previous years.

In Ceylon there has been no serious outbreak except in 1916, when infection was introduced by the S.S. "Peiho" from Saigon with a labour party of 2,285 coolies from Annam, en route for Marseilles. We are told that "the information available as to the occurrence of cholera in the Chinese Empire is scanty," but readers of the *Bulletin* know that there have been many epidemics among its 400,000,000 [v. this *Bulletin*, Vols. 15 and 16]. Japan, an Island Empire, seems to get its worst outbreaks by importation from China. With the exception of 1916 there has been little cholera: five cases and four deaths in 1914, none in 1915. Apart from the danger from ships, islands were generally very free from cholera during 1914 to 1917.

The Report makes a sudden stride from the Hawaiian Islands to the British Isles, entirely free from cholera for years although cases have occurred on ships visiting our ports. In the war area cholera caused no trouble except in Prussian Silesia, Pomerania and in Austro-Hungary, where more than one serious epidemic occurred. *The Times* of October 19th, 1914, published a statement from its own correspondent at Rome that 10,000 cases had been reported in a single day, but this was not supported by the official communiqués. During 1915, Austria, Hungary, Croatia-Slavonia and Bosnia and Herzegovina furnished figures giving 41,454 cases with 21,751 deaths. Further East, until India with which we began is reached, epidemics occurred with increasing death-rate. This statement does not include Egypt, the Sudan or Africa generally. Excluding India, the rest of the British Empire, Canada, Australia, and New Zealand, ranks in freedom from cholera with the British Isles.

The greatest progress as regards cholera has been in the realm of prevention, the value of vaccines and the recognition of various strains and varieties of *V. cholerae*, the "comma" bacillus (*Spirillum*). The fact that bacteria, like other plants, vary and come into line with general evolution has slowly forced itself to the front; and such expressions as "cholera-like" should be swept away. Bacteriologists have accepted certain tests and reactions for differentiating what is known as the type bacillus, as seen in Asiatic cholera:—

1. Growth in an alkaline culture-medium in which growth of other faecal bacteria is inhibited. Such media are: *Dieudonné's*, *Krumwiede's* and *Esch's*. It does not grow well on potato, and on the peptone solution the colonies are to be distinguished by their transparent, bluish-grey appearance with formation of a pellicle.

2. Nitroso-indol test: The production of "cholera-red" after 24 to 48 hours in Dunham's peptone solution (Witte's peptone) 1 per cent. with 0.5 per cent. NaCl in distilled water) to which 6–8 drops of strong H_2SO_4 have been added. It is necessary to remember that this violet-pink colour is not obtained with all samples of peptone sold.

3. Does not liquefy gelatine so rapidly as some vibrios, but these do not give the cholera-red reaction ; does not coagulate milk ; no gas production in solutions containing the usual test sugars.

4. Rapid motility ; pleomorphic, so that several tubes of the culture solution should be made and examined in the hope of finding the coccoid and rod forms which may occur.

5. Is scarcely pathogenic for pigeons, and more pathogenic for guinea-pigs than for rabbits.

6. Does not produce haemolysis on blood-agar as does the " El Tor " (Egypt) variety which otherwise (agglutination, etc.) resembles the type ; readily answers to the agglutinating serum in titre of 1 : 500 and even 1 : 10,000. As Hindus will not work with culture media which contain beef broth, they use mutton broth.

IYENGAR states that :—

" 1. Many of the growth characters on which the differentiation of species is made depend on conditions which are by no means fully worked out.

" 2. The failure to obtain specific reactions in organisms under test does not always justify the conclusion as to the divergence of the organism from the type, or as to the imperfection of the nutrient media.

" 3. Pellicle formation by the cholera vibrio, and probably indol formation, is dependent on the alkalinity of the medium used.

" 4. The highly nutritive character of the medium is probably a determinary factor in the production of pellicle by *V. cholerae*." [This *Bulletin*. Vol. 17, p. 402]

These characters being accepted, any other " comma " bacillus producing clinical cholera can be included as a variety.

In the matter of prevention, the use of vaccines has been of the greatest value. The question of prophylaxis was urgent in 1915 when the enormous armies were in formation and when cholera was known to be raging in Russia. Early experience in India was recalled (SIMPSON, W. J.) when Haffkine's vaccine was used. Even then it was shown that with uninoculated and inoculated living side by side in similar huts the giving of a living vaccine lowered the mortality in one epidemic from 10·86 per cent. to 2·99 per cent. Using a strong vaccine with larger numbers (over 13,000), the incidence in the uninoculated was 3·02 per cent., whilst among the inoculated it was only 0·47 per cent. As far back as 1885-86 FERRAN, in Spain, treated 40,000 persons with a vaccine of living cholera vibrios, a somewhat rash act followed by disaster. Since, as will be noted, cholera vibrios vary in action and virulence, it is best to prepare a vaccine from the first cases of each epidemic (using a stock vaccine, at once, when infection is detected). A good example of a stock vaccine is that mentioned by Oscar TEAGUE, as used in North America. It consists of a culture of *V. cholerae* grown on alkaline nutrient agar, suspended in physiological salt solution and killed by heating for one hour at 53° C. Another good stock vaccine, used in India and issued by Colonel Glen LISTON from the Bombay Government Laboratory, contains 8,000 million organisms per cc. ; 0·5 cc. is given as a first injection and 1 cc. for the second. The Kasauli Laboratory also furnishes a vaccine which has been used with success, as may be seen by reference to Vol. 16, pp. 40-41. At Hurhuru, during an epidemic, the death-rate among the uninoculated was 64 per cent. ; among the inoculated it was only 37·5 per cent. (Ashutosh Roy). KOLLE's results in 1913 (Vol. 16, p. 41) show that with 91,224 persons

protectively inoculated and 8,968 unprotected, there was, among the inoculated, a sick rate of 0·7 per cent. and a death-rate of 10·2 per cent.; while for the smaller number of uninoculated the figures were 9·3 per cent. and 27·5 per cent. Very little work has been done with "lipo-vaccines" recommended by LE MOIGNIC and SÉZARY [Nouvelle méthode de Vaccination Anti-typhoïdique, 1918. Baillière et Fils (Paris).] This little book was reviewed by the writer of this summary, and he believes the "lipo-vaccine" to be of value. Reasons for this belief will be found in Vol. 12, pp. 361-363. One objection offered to the use of vaccines suspended in oil is that bacteria resist a higher temperature in oil than in a water solution. This might be overcome. The experiments of Stanislaw SIERAKOWSKI are of interest, and his tables of results show the effect of method of preparation on agglutination [Vol. 17, p. 403-404].

Since the "El Tor" strain produces haemolysis in blood cultures, it might be advisable to avoid the use of this variety for vaccines. Working in Japan, Korea and Formosa, WATANABE (Y.), KAWATANI (S.) and WATANABE (W.) obtained from previous epidemics in different geographical areas 56 strains. These, when studied and compared with the *V. cholerae* found in the 1920 outbreak, showed that the 1920 strain exhibited little difference from the one which caused the 1916 epidemic. Some of the strains cultured produced fairly strong haemolysis. Only one specimen from Korea agreed in character with "El Tor 1906." Major J. C. McCombie YOUNG has pointed out that protective inoculation has a distinct economic value. Writing in the *Indian Med. Gaz.*, 1919, pp. 407-410, he says, speaking as *ex-officio* Superintendent of Emigration: "By the third week in March inoculated coolies began to appear upon the railway routes, and by the fourth week in March most of the emigrants travelling to Assam, whether by rail or by river, had been inoculated with a single dose of cholera vaccine before commencing the journey. Those who have been concerned with the work of inoculations are curious to ascertain the results of their labours, and those who have met the cost of it wish to know what they have received for their money. The ratio of deaths per mille of emigrants travelling was for March 15th to 21st 8·50, with an average of 6·78 for January, February and March to the 21st. After the introduction of prophylaxis the ratio fell and gave an average of 1·8 per mille from March 22nd to May 31st."

In addition to the elucidation of the characteristics of various strains of vibrio, it is now known that the cholera toxin destroys the alkalinity of the blood, producing an "acidosis" which leads to that late and most dangerous condition—cholera uraemia. It was this discovery by SELLARD and ROGERS which led the latter to add bicarbonate of soda to his hypertonic salt solution. This bicarbonate becomes converted into carbonate, and readjusts the normal alkalinity of the blood, the saline fluid supplying that lost in the vomit and "rice-water" stools. In the *Brit. Med. Jl.* for June 1919, Professor BAYLISS suggests the addition of gum acacia to the alkaline hypertonic salt solution, hoping to prevent the further escape of fluid from a blood circulation damaged by the cholera toxin. Sir Leonard ROGERS tried this method and wrote [Vol. 14, p. 183]: "The failures have been a great disappointment to me, but I believe the explanation to be that the gum solutions lead to the retention, in the circulation, of the deadly cholera toxins." The addition of gum to saline solutions, used

during the war in cases of uraemia and surgical shock, had proved of great value ; but the conditions met with in cholera are different owing to the effect of the special vibrio toxin. Professor BAYLISS based his suggestion on his experience in other fields. He found that with regard to the excretion of certain other toxins through the kidneys, one of the most striking facts was the restoration of the flow of urine, by gum-saline, when it had stopped from various causes. Benjamin MOORE, in the *Brit. Med. Jl.*, 1919, Oct. 18, pp. 490-492, pointed out that the results obtained by BAYLISS and ROGERS were not absolutely contradictory but in keeping with the findings of French workers on anaphylaxis. Firstly the positive effect of a colloid, such as blood-protein, gelatine or gum acacia in shock due to haemorrhage, surgical injury, etc., as compared with the effect of simple hypertonic salines, is that the situation is one of a circulating fluid not merely defective in total volume as in cholera where the blood is thick and "tarry" ; but poor in colloid compared to salts as in the conditions above noted. In these latter conditions the gum serves to anchor inorganic salts preserving equilibrium—and thus alkalinity—not only in the blood vessels but in the cells of the brain and heart. Secondly the inefficiency of gum solutions in cholera is due to the presence of excess of toxic cholera colloid. MOORE further points out that : " free saline in the blood, in such diseases as cholera, combines with toxins to form a crystallo-colloid union, and this is an essential factor in excretion of the poison by the intestines and kidneys."

SANARELLI and CANTACUZÈNE [Vol. 15, pp. 80-81] found that vibrios injected into the peritoneal cavity of guinea-pigs settle in the walls of the intestine, and the latter author writes :—

" By whatever point the cholera vibrio enters the body it makes for the intestines and always finally reaches the walls of the small gut (as in nearly all initial infections of human beings). There it pullulates. . . . One is struck at autopsies of acute cholera cases by the fact that vibrios are often rare in the contents of the small intestines. Investigate the mucous membrane deprived of its epithelium : there they pullulate and at the same time undergo a vibriolysis, the more intense as the toxic phenomena are more acute. It seems that the mucous membrane contains some substance which acts upon the cholera vibrio in such fashion that it increases both virulence and its power to produce toxin."

The experiments of CANTACUZÈNE and MARIE showed that a small dose of extract of small intestine of the guinea-pig, or of the caecum—quite harmless when injected alone—when added to a non-lethal dose of vibrios and injected into the peritoneal cavity, sufficed to cause an acute and fatal cholera intoxication. Thus : 10 guinea-pigs which received vibrios (from culture) plus extract of intestinal mucous membrane (guinea-pig) died in 3-11 hours ; the two controls inoculated with the same dose of the culture only, showed no signs of illness. The intestinal extract from 'vaccinated' animals was found to protect against even a mortal dose. The conflict between the cholera toxin and the body cells is, more or less, confined to the small intestines. The vibrio rarely invades the body. It is, however, liable to invade the gall-bladder as GREIG has shown in a plate, reproduced in Vol. 15, opposite p. 70. Here it may remain after it has disappeared from the intestines where it meets with bacteria which are inimical to the development of the "comma." Such are : *B. pyocyaneus*, *B. proteus*, *B. lactis aërogenes* and *Streptococcus faecalis*. Thus the gall-bladder is the home of *V. cholerae* in the "carrier," and, as it may remain for some

time in the bile, there may be, and probably is, a slow auto-inoculation giving permanent immunity to the "carrier," although he is a danger to others.

The artificial immunity following vaccination lasts, so far as we at present know, only for about four months; but second attacks of cholera are almost unknown. The danger in the case of the "carrier" lies in the escape, from time to time of vibrios from the intestines, and outside the body these may become the origin of epidemics. GREIG (*Edinburgh Med. Jl.*, 1919, Vol. 23, pp. 4-22), describes the production of a carrier by experiment. Living vibrios were injected into the ears of rabbits, animals more resistant to cholera infection than guinea-pigs or than man. They passed into the bile from which they could be obtained in pure culture, but no symptoms of cholera occurred. If further injections into veins are made, cholecystitis occurs, with formation of calculi round a nucleus of "commas." Still no pathogenic results, and GREIG has found such calculi in rabbits which had received the last inoculation a year previously. Although, as stated, the "comma" rarely invades the body generally, it has been occasionally found in small pneumonic areas after death. It is rarely isolated from the blood of the patient. GREIG's attempts were always followed by negative results. Out of 55 cases in which the urine was examined the vibrio was found only in 8. Two of these had completely recovered and were at work. Such "carriers" might at any time be a source of danger. They should be kept under observation. Old cultures of the "El Tor" vibrio—1913-16—do not form good material for experiments on rabbits as shown by the work of CRENDIROPOULO. He required a strain which would enable him to compare the effects of cholera poison given by various routes: mouth, rectum, through veins, and by interperitoneal injection. Discarding the "El Tor" strain he preferred to work with a vibrio brought from a patient in Annam (1916). He found that vibrios injected into the rectum passed—in 75 per cent. of the experiments—up the gut and that the lethal dose was from 1/50 to 1/100 of a culture. 1/100 of a culture injected into veins of the ear often produced no effect and the vibrios were eliminated by the bowel. 1/30 was lethal and by the intraperitoneal route it required 1/15 of a culture to produce any pathological results.

As regards agglutination, the response, negligible in fatal cases, is generally well marked; even in mild cases, the titre showing formation of antibody may be very high. TANOUÉ and WATANABE found a positive agglutination in 87 per cent. of their cases. The reaction was seen on the third or fourth day, generally within ten days, and disappeared somewhat rapidly after the third week. In most cases the titre was from 1/100—1/400, and the highest was 1/10,000. In an epidemic which occurred in Manchuria during 1920, SHIIBA and OYAMA found the serum obtained from patients showed very great individual variation in the immunity index. Generally speaking the agglutination titre was higher in Japanese than in Chinese, and the maximum was reached about the second or third week. For details see Ohshima's summary (Vol. 17, p. 405).

A strong test serum should be used and one that is known to agglutinate the type vibrio. With such a serum GREIG found in the excreta of cholera cases, in India, vibrios which did not agglutinate, although morphologically like type *V. cholerae*. Moreover, they, like the "El Tor" variety from Egypt, haemolyse the red blood corpuscles. These may be, he thinks: (a) True cholera germs which have lost certain

attributes, or (b) foreign bacilli partly humanized, that is only partly adapted to parasitic life in man. Other vibrios have been described: "Izonso" and those which CASTELLANI proposed to call para-cholera germs, viz., *V. kagallensis*, *V. El Tor* and *V. Gindha* from Erythrea. These latter, like the germs noted by GREIG are not agglutinated by the "type serum." VON EISLER (this *Bulletin*, Vol. 15, p. 82) describes the haemolytic action of the "Kadi-Kjo" vibrio.

As to climatic effects on the occurrence of epidemics, work in India (GREIG and others) has shown that cholera returns with the spring months and shows "every year the same phenomena as the epidemic increases." In the "rice-water" stools only true cholera vibrios occur. As the epidemic reaches its highest point and begins to decline the "pseudo-cholera" germs begin to appear, becoming more numerous as the disease dies out. Using the serological test they may be arranged in groups. It would seem therefore, that the varieties observed by GREIG come under (a) and are not true botanical varieties as are those elsewhere recorded.

Fresh light has also been shed on the life of *V. cholerae* outside the human host. GREIG carried out the only kind of experiment which can be accepted as trustworthy. Earlier experiments were, in most instances, carried out with old "cultures." He took the "commas" direct from the stools of patients; they were kept in the dark, protected from the bactericidal influence of the Eastern sun, in flasks, at room temperature. The number of vibrios was estimated daily until the flasks were free from living germs. The following table gives some idea of the saprophytic life of vibrios thus taken direct from the patient.

Month in which Examination was Made.	Number of Cholera Stools Examined.	Duration of Life in Days.		
		Minimum.	Maximum.	Average.
December, 1912 ..	9	10	10	3.6
January, 1913	6	1	12	6.6
February	13	3	17	7.7
March	20	1	13	6.5
April	22	1	5	2.8
May	10	1	3	1.4
June	15	1	2	1.2
July	—	—	—	—
August	4	1	12	6.0
September	3	4	5	4.3
October	3	3	4	3.7

Temperature forms an important item in shortening the extra-corporeal life of the cholera vibrio. In Calcutta the cold season life is longer than the life during the hot and rainy months. This is shown more or less, in the above table. GREIG's work was done in Calcutta, where the temperature ranges from a mean maximum of 102° F. in May, to 48° F. the mean minimum of January. The months in which an epidemic is most to be feared are the colder winter months (in India at any rate), since with lengthened extra corporeal and saprophytic life, there is, when vibrios are expelled by "carriers," a greater possibility of water and food infection. Test-tubes and media used for cultures should be destroyed by fire. Similar results were recorded by Otto SCHÖEHL for the extra-corporeal life of cholera vibrios in water in Manila [Vol. 6, p. 38].

The only other important progress to be noted has been in the treatment of cholera in the early stages, during the reaction period and in post-choleraic uraemia. This division into stages is a matter of custom and convenience, but all these conditions are progressive effects of the cholera toxin. ROGERS and COX in India and China, with CADBURY and HOFMANN in America, saw that it was necessary to replace the fluids and salts lost during the early stages of the disease. A simple physiological salt solution would not stay in the blood-vessels, and hypertonic salt solutions were tried with a wonderful success, as shown by the lowered death-rate. To this, Sir Leonard ROGERS and his co-workers added other salts required and rendered the fluid, used for treatment, alkaline. A very good summary of modern treatment is given by A. G. VARIAN [Vol. 15, p. 83; see *Dublin Jl. of Med. Sci.*, 1919, pp. 66-74]. The points to be kept in view are: (1) To replace the lost fluids and salts by hypertonic saline intravenous injections, giving sufficient to raise the blood-pressure to normal and to keep it normal until all danger is past. The following are some of the solutions that have been employed with success:—

(a) Sodium Chloride	..	..	..	120 gr.
Calcium	"	..	..	4 gr.
Potassium	"	..	..	6 gr.
Water to	..	..	..	1 pint (Varian).
(b) Sodium Chloride	..	..	..	8.0 gm.
Calcium	"	..	..	0.25 gm.
Potassium	"	..	..	0.40 gm.
Water	..	..	..	568.0 cc. (Wu Lien Teh and Chun).

The addition of the alkali is not absolutely necessary unless there are signs of anuria and uraemia pointing to acidosis. In such cases the use of alkalis injected into the veins has been followed by a reduction of the death-rate in post-choleraic uraemia by 70 per cent. The alkaline solution should be of the following strength:—

Sodium Chloride	..	..	..	60 gr.
" Bicarbonate	..	..	..	160 gr.
Water to	..	..	..	1 pint.

The amount of saline fluid required during the early stages of an attack of cholera, in order to prevent collapse, is gauged by watching the blood-pressure (pulse beats) and the specific gravity of the blood. Pressure is generally estimated by a sphygmometer, "Riva-Rocci" or other pattern, and the specific gravity of the blood is estimated by the "drop method" in known stock solutions. The danger point as regards pressure is 70 mm., and when the sphygmometer shows such a record, injections must be given at once until 105 mm. at least, is attained. A specific gravity above 1.032 requires attention, and, as a rule, with specific gravity of 1.066 about 4 pints must be used to lower it to as near normal as possible (1.032). Above 1.066, 6 pints should be injected. The hypertonic saline is injected at body temperature unless there is a high temperature; it should then be as many degrees below 100° F., as the patient's temperature is above that figure.

There has been nothing reported in the medical literature of cholera to show that anti-cholera vaccines are of any use in treatment. Atropin and adrenalin have been added to the saline fluids in order to stimulate the heart.

In the *China Med. Jl.*, 1920, pp. 243-258, will be found papers on treatment (v. this *Bulletin*, Vol. 16, p. 434) by Messrs. BRAAFLADT, WYLIE and SNELL: Out of 100 cases 41 received the recognized

"saline" treatment only; of these 9 died (22 per cent.); 24 received "saline" plus Kaolin, 3 ounces in water by the mouth, with 7 deaths (29 per cent.); 35 Kaolin only, with 1 death (2 per cent.); but it must be stated that the majority of the Kaolin treated cases were classed as less severe, whereas the majority of the others were "more severe" (BRAAFLADT). Blood-pressure was not taken. Dr. WYLIE did not try any treatment except the orthodox one; and was careful to take the blood-pressure of his patients. "If the blood-pressure was down to 80 mm., or the specific gravity of the blood was up to 1,063, we gave an intravenous injection of hypertonic saline, using 3 pints for 1,063, 4 for 1,064"; and so onward. The point noteworthy in Dr. SNELL's paper is that he considers "treatment of the kidneys" as the most important issue. In 62 cases casts were found in the urine of 48. Five patients died before a specimen of urine was obtained; they may have had casts in the urine. Blood-pressure was estimated by Dr. WYLIE with a Tycos instrument.

In the *Indian Jl. Med. Res.*, 1918, Vol 5, pp. 570-609, will be found an interesting paper by J. A. SHORTEN on the biochemistry of post-choleraic uraemia. In 1914, working in Calcutta with Sir Leonard ROGERS, he began investigations into the variation of alkalinity of the blood. Stopped by the war, this investigation was resumed when carnage apparently had ceased. The work was carried out in the Medical College Hospital for Indian patients, and the main object of the investigation was to determine the increase, if any, in the urea content of the blood. Other factors considered in the research were: titration alkalinity, percentage of inorganic phosphates and chlorides in the serum; the following are the valuable results obtained, as an average in 10 healthy Bengalis: urea, 0.037 per cent.; alkalinity N/32.8 [this is generally about N/35 in normal Europeans]; P_2O_5 , 0.0145 per cent.; NaCl, 0.608 per cent. Percentage in these results equals gms. per 100 cc. of blood. In choleraic uraemia there was an increase in urea and in P_2O_5 . Sodium chloride was absent in one case and gave a percentage of 0.637 in another. Alkalinity was decreased: showing N/50 and N/90. Dr. J. C. MUKARJI has found that lime water is distinctly inimical to the growth of *V. cholerae* if used in sufficient quantity. As fluid is so useful this might with advantage be given freely as a drink to cholera patients, alone, or as the vehicle for Kaolin, thus helping to wash vibrios out of the intestines. There is, of course, little, if any, absorption of drugs in the stomach, but in the early stages an acid drink would be useful to wash out that organ. Emetine has been used in some mild cases, and since it provokes a flow of bile it is no doubt useful.

On general sanitation it is not necessary to make any remarks since it is the same for all water and food-borne infections. There are improved septic tanks and improved latrines for oriental races and improved water supplies are being introduced in India, etc., when funds permit.

TROPICAL OPHTHALMOLOGY.

FISCHER (E. C.). **The Prophylaxis of Trachoma.**—*Bull. Ophthalm. Soc. Egypt.* 1920. pp. 1-14.

Fischer brought up the important subject of the prophylaxis of trachoma for discussion by the Society, and advocated (1) the extension of the system of ophthalmic hospitals, and (2) the education of the people. Under the latter heading, he would organize propaganda in the hospitals and ophthalmic centres, and also in the mosques, schools, newspapers, and homes. He would make use of the Provincial Councils and other executive bodies, and, above all, he would have attention paid to the girls, who are to become the mothers of the race. In the discussion which followed, there was considerable difference of opinion as to the best course to pursue, and a considerable tendency towards pessimism was exhibited. It was decided to nominate a committee to study and report on the problems connected with trachoma in Egypt.

R. H. Elliot.

MACCALLAN (A. F.). **The Pathognomonic Signs of Trachoma.**—*Bull. Ophthalm. Soc. Egypt.* 1920. pp. 15-16.

The paper by MacCallan is tantamount to the admission that for the diagnosis of true trachoma, we must await the late evidences of cicatrization. It, however, provides no help in the early stage of the cases, and it is with these that differential diagnosis is most interested.

R. H. E.

ABBOUDY (A.). **Traitement de l'ulcère cornéen trachomateux.**—*Bull. Ophthalm. Soc. Egypt.* 1920. pp. 17-21.

Abbouady, for this condition, advocates the daily rubbing of the conjunctiva with a solution of cyanide of mercury (1 in 500) on a woollen swab, the lids being everted for the purpose. In the presence of troublesome recurrences of the corneal ulceration he adopts the procedure of ABADIE, which consists in making a series of punctures with the thermo-cautery into the upper cul-de-sac, each puncture being a centimeter in depth, and 3 or 4 mm. distant from each other; four or five such punctures are made in all. He follows up the operation with the daily cyanide treatment above described, and claims to have obtained excellent results thereby.

R. H. E.

SEDDIK (Zaki). **Fleshy Pannus and its Treatment.**—*Bull. Ophthalm. Soc. Egypt.* 1920. pp. 25-28.

Seddik describes the various methods of treatment in vogue for this condition, and advocates the scraping of the cornea combined with Meisrath's operation, with a view to shortening the disease, and anticipating the natural process of cicatrization. In the discussion several speakers supported the claims made.

R. H. E.

STUCKEY (E. J.), TOMLIN (H.) & HUGHES (C. A.). **Trachoma among the Chinese in France.**—*Brit. Jl. Ophthalm.* 1920. Jan. Vol. 4. No. 1. pp. 1-12.

This paper describes how the Chinese coolies in France were medically examined, classified and organized with a view to preventing the spread of trachoma in Europe. The diagnosis, bacteriology, treatment and prophylaxis of this condition are dealt with at some length. This communication not only impresses one with the thorough way in which the work was done, but also indicates that in this instance, at least, square men were not put into round holes.

R. H. E.

LEA (J. Augustus). **The Treatment of Trachoma.**—*Brit. Jl. Ophthalm.* 1920. Sept. Vol. 4. No. 9. pp. 417-418.

Lea asserts that the cases of trachoma met with in South Africa resemble the oriental type, described by STUCKEY, TOMLIN and HUGHES, which differs in material points with that met with in this country. He recommends the use of an instrument like a tattooing needle, bent at right angles; this is dipped in a mixture of equal parts of strong acetic acid and water, and is then used to prick each granulation in turn. If the granulations are very numerous, he scarifies the part with the instrument, wet with the acid solution. Anaesthesia is obtained by the use of cocaine and adrenalin, and the excess of acid is washed away.

R. H. E.

DAVID (J.). **Prophylaxie des Ophthalmies en Orient.**—*Presse Méd.* 1920. Nov. 17. No. 84. pp. 828-829.

This paper by David is certainly arresting, and if his contentions can be made good by the experience of others, the work promises to be epoch-making. He uses a 1 per cent. solution of sulphate of zinc, to which is added 5 per cent. of a 1 in 1,000 adrenalin chloride solution; two drops of this solution are instilled daily into healthy eyes. He claims that by this treatment, he was able to keep a school in Lower Galilee, and a number of workmen in the neighbourhood, absolutely free of acute conjunctivitis, which was raging in the surrounding population. This was in 1913-14. On returning to Palestine in 1919, he had an equally extraordinary experience with 800 school children. The treatment was suspended for three weeks; conjunctivitis then broke out in the school, and at once disappeared when the treatment was resumed. There was not a single case of fresh trachoma among the subjects thus treated, which David explains on the ground that these other infections pave the way for the implantation of the trachoma virus.

R. H. E.

VON SKRAMLIK. [**Argyrosis of the Lachrymal Sac.**]—*Klin. Monatsbl. f. Augenheilk.* 1915. Apr.-May. p. 443.

The patient had used a 1 per cent. solution of silver collosol intermittently for a year. There was marked staining of the conjunctiva; the removal of the sac permitted a microscopic examination of the walls of that structure, whose sub-epithelial connective tissue was diffusely

stained of a brown colour. In addition to this brown stain, both the superficial and deep structures of the sac wall showed a number of granules, grey to black in colour, and lying either within the cells or as a deposit on the elastic fibrils present in the walls. Von Skramlik considers that the brown coloration, met with in these cases, is due to the formation of an albuminate of silver, while he regards the granules as deposits of metallic silver. Apart from the interest of these investigations in affording us an exact knowledge of the pathology of silver-stained tissues, there is a lesson for every practitioner in the tropics, viz., that we cannot pour in *any* silver preparation without a risk, or even more than a risk, of producing argyrosis. Each new form of silver-containing drug has been boomed as free from the danger of producing argyrosis, a claim which time has invariably destroyed.

R. H. E.

NEAL (James Boyd). **Diseases of the Conjunctiva as met with in Tsinan.**—*China Med. Jl.* 1920. Sept. Vol. 34. No. 5. pp. 475-478.

Neal comments on the vast preponderance of diseases of the conjunctiva in tropical ophthalmic practice; these constituted nearly 50 per cent. of the total cases in one year and 60 per cent. in another. Phlyctenular conjunctivitis is extremely common, constituting from 1/6th to 1/7th of the total cases; it is most prevalent in spring and autumn. The cases of granular conjunctivitis are about on a par in numbers with those of the phlyctenular disease. Purulent conjunctivitis is rare in Northern China, only occurring in from 1 in 120 to 1 in 145 of new cases. In view of the frequency with which gonorrhoea is met with in China, Neal considers that the low figure for purulent ophthalmia is to be explained by the cleanly habits of the Chinese, who wash their hands diligently after any possible contamination. Pterygium is very common in China, as it is in all other hot, dusty lands.

R. H. E.

COMBERG (W.). [On Swimming Bath Conjunctivitis].—*Zeitschr. f. Augenheilk.* 1920. Vol. 44. Part 1-2.

Comberg's investigations into a severe epidemic of swimming bath conjunctivitis in a well-built and well-cared-for swimming bath in Berlin are of special importance to those interested in tropical ophthalmology, for they show how the conjunctiva may be readily infected from contaminated water, and suggest a possible line of investigation in the aetiology of the epidemics of conjunctivitis with which we are so familiar in Eastern countries. It may well be that contaminated water, in the tropics, at certain times of the year, may be one of many possible factors in the production and dissemination of these epidemics. [The subject is one that may well be commended to the attention of workers in Eastern lands, both for its intrinsic interest, and for the valuable results that may be attained by such investigations.]

R. H. E.

MACCALLAN (A. F.) & BEATON (E.). **Gonococcal Conjunctivitis in Egypt.**—*Bull. Ophthalm. Soc. Egypt.* 1920. pp. 53-55.

These writers draw attention to the differences, familiar to tropical practitioners, between gonococcal conjunctivitis, as seen in Egypt and in some other tropical and sub-tropical countries, and in Europe: (1) It usually results from contagion acquired from another conjunctiva instead of from the genital organs; (2) it is frequently sub-acute or chronic in course; (3) it shows definite seasonal variations, becoming epidemic as the atmospheric temperature rises; (4) it is a far less virulent disease than that met with in Europe, the cornea often escaping. The present research was undertaken to ascertain whether the Egyptian disease is truly gonococcal, or whether the organism responsible is a different one with similar morphological characteristics. The results obtained so far all point to it being the former, and Beaton has now commenced a further study by preparing immune sera, with the object of throwing light on the specific vital characteristics of the Egyptian conjunctival organisms as compared with genital gonococci.

R. H. E.

BLANC (Georges). **Conjunctivite phlycténulaire et pédiculose.**—*Bull. Soc. Path. Exot.* 1920. Oct. 13. Vol. 13. No. 8. pp. 645-646.

Blanc has noticed a close connection between pediculosis of the scalp and phlyctenular conjunctivitis, both in France and at Tunis. It is of peculiar interest that the connection between these two conditions held in his tropical practice equally for Europeans and for Arabs. He has had similar experiences both at Athens and in Crete. To confirm the connection, he injected into the eye of a monkey an emulsion of ground-up lice, and produced a typical phlyctenular conjunctivitis a little over two months after the inoculation.

R. H. E.

MCALL (P. L.). **Notes on a Rare Form of Subconjunctival Granuloma, met with in Central China.**—*Brit. Jl. Ophthalm.* 1920. Jan. Vol. 4. No. 1. pp. 20-25. With 8 figures; and *China Med. Jl.* 1921. Jan. Vol. 35. No. 1. pp. 26-30. With 7 figures.*

In this interesting condition the sight is partly or entirely obstructed by the formation of tumour-like masses, which grow between the eyeball and the lids. No form of inflammation is present; there is no pain, and no tendency of the growths to break down. Most of the patients are men; their ages run from 15 to 40. The progress of the disease suggests that the tissue beneath the conjunctival fornix is hypertrophying, and slowly pushing the conjunctiva before it in the form of a fold between the globe and the lids. By degrees the conjunctiva and lids are themselves involved, the palpebral masses bulging forward very markedly. No infection can be traced as responsible for the trouble. Operation is of no avail, as it merely leads to cicatrization, and does not prevent recurrences of the growth. The bulk of the tumour is composed of round cells (lymphocytes), which infiltrate the normal tissues.

R. H. E.

* The illustrations to MCALL's paper are reproduced in ELLIOT'S "Tropical Ophthalmology" (Oxford Medical Publications), Figs. 86-92.—Ed.

HENDERSON (E. Erskine). **On a Rare Form of Subconjunctival Granuloma met with in China.**—*Brit. Jl. Ophthalm.* 1920. Vol. 4. p. 93.

Henderson suggests that the tumours described by McALL are almost certainly parasitic, and either protozoal or helminthic; he suggests a careful blood examination for eosinophilia.

R. H. E.

MOTAIS (F.). **La Sparganose Oculaire.**—*Arch. d'Ophthalm.* 1918. Sept.-Oct. Illustrated.

Motais publishes a case in which the presumed larval form (*Sparganum mansoni*) of *Bothriocephalus liguloides* was removed from the eyelid of a boy of 11, whose whole life had been spent in Hué (Annam). Occasional redness of the eyes and oedema of the lids had been noticed for about a year, in association with a swelling of the upper lid of the left eye. The tumour had slowly increased in size, was the size of a haricot bean, was movable and elastic to the feel, and lay at the upper, outer portion of the lid in the connective tissue and in contact with the palpebral conjunctiva. It was easily removed, and the larva was found imbedded in rather dense, vascular tissue, surrounded by fat, and lying in a cavity which contained fluid. The condition called "ocular sparganosis" is well known in Japan and in the Tonkin delta.

R. H. E.

PACHECO-LUNA (R.). [**Contribution to the Study of Onchocercosis.**]—*Revista Cubana de Oftalmologia.* 1920. Jan.-June. Vol. 2. Nos. 1 and 2. pp. 80-99.

Pacheco-Luna is the first to draw attention to the presence of eye lesions in patients attacked by the filariform nematode *Onchocerca volvulus*, which is of common occurrence amongst the West African negroes. The skin tumours, which contain the worm, are well known in Guatemala, and the condition is spoken of there as "Coast Erysipelas." The eye condition reminds Luna of FUCHS' "superficial punctate keratitis." The course of the trouble is exceedingly prolonged. It may eventually end favourably, though traces of the trouble are always left permanently; on the other hand, serious irido-cyclitis may come on, with disastrous consequences. The removal of the skin tumours is the only rational treatment of the condition, and the results of this method of dealing with the case are brilliant so far as the symptoms are concerned. The paper contains a description of the parasite by T. M. IZQUIERDO, to whom Pacheco-Luna sent specimens of the skin tumours, taken from cases in which eye symptoms had been present.

R. H. E.

WRIGHT (R. E.) & PATTON (W. S.). **A Case of Myiasis of the Frontal and Ethmoidal Sinuses and the Orbit.**—*Indian Med. Gaz.* 1921. Feb. Vol. 56. No. 2. pp. 58-59. With 1 text figure.

Wright's patient was a Hindu woman of 30, whose supra-orbital and inter-orbital regions were alive with maggots; the bones had been extensively attacked; the surrounding sinuses were freely involved; the dura was not exposed. The eyeballs were exposed, proptosed, and

pushed outwards ; the cornea of one of them was ulcerated. There was marked oedema and a foul discharge. The cavity was irrigated with permanganate solution, and turpentine applications were made ; 50 maggots were removed the first day and 30 the next. Chlorine solution was substituted for the permanganate, and iodoform packing adopted. The prognosis was stated to be good for life, but poor for sight. The extrinsic muscles of the eyes had been extensively destroyed. Patton identified the maggots as the mature larvae of *Chrysomya bezziana* Villeneuve.

R. H. E.

SOBHY (Mohammad) & EL KATTAN (Mahmoud Azmy Mohammad).
A Probable Case of Monilethrix affecting the Eyebrows and Eyelashes.—*Bull. Ophthalm. Soc. Egypt.* 1920. pp. 43-47.

The clinical features of this interesting case are described and the previous literature is discussed. Notes of a further case of the same kind were contributed by Dr. Azmy in the course of the discussion.

R. H. E.

KIRKPATRICK (H.). **An Epidemic of Macular Keratitis.**—*Brit. Jl. Ophthalm.* 1920. Jan. Vol. 4. No. 1. pp. 16-20. With 2 illustrations.*

Kirkpatrick calls attention to a hitherto undescribed form of keratitis occurring in India in a mild epidemic form. No bacteria or other organism could be identified as the cause of the trouble ; there is a singular lack of local reaction ; there is an apparent absence of contagion ; one eye only is usually attacked ; the patients show no constitutional defect. Three types are described : (1) A superficial punctate keratitis ; (2) a large patch of keratitis is found, with a dense linear portion from which the opacity fades away into the healthy cornea ; one or two soft, detached spots are found in the neighbourhood ; (3) a single spot only is present ; this is dense, circumscribed and often slightly raised. Ulceration is characterised by its absence in all the forms. The disease would seem to have affinities with the conditions described by HERBERT in Bombay and by WESTHOFF.

R. H. E.

KIRKPATRICK (H.). **The Use of Magnesium Sulphate as a Local Application in Inflammation of the Conjunctiva and Cornea.**—*Brit. Jl. Ophthalm.* 1920. Vol. 4. p. 281.

Kirkpatrick advocates the use of strong solutions of magnesium sulphate (from gr. 40 *ad* ʒi, up to saturation) as an eye bath, for five minutes at a time, every two or three hours, in suppurative inflammations of the cornea, in trachomatous eyes suffering from secondary infections, in many chemotic conditions met with in the tropics, and in the early stages of panophthalmitis. Pain is lessened, swelling and oedema are reduced, and many conditions are very favourably influenced.

R. H. E.

* The illustrations to KIRKPATRICK's paper are reproduced in ELLIOT'S "Tropical Ophthalmology" (Oxford Medical Publications), Figs. 82 and 83.—Ed.

GANGULY (S. K.). **Off-Hand Diagnosis of Cataract.**—*Indian Med. Gaz.* 1921. Apr. Vol. 56. No. 4. pp. 131–133.

Ganguly protests against the slovenly diagnosis of cataract and the insufficient data of a lightning examination, and warns medical men in India against such a practice. He gives a list of the conditions thus mistaken for cataract, which includes refraction errors, glaucoma, and optic atrophy. The reviewer can testify that the warning is not unneeded in Indian practice at least, and he trusts that it will not be unheeded.

R. H. E.

PI (H. T.). **Native Ophthalmic Practice in China.**—*Nat. Med. Jl. China.* 1920. Sept. Vol. 6. No. 3. pp. 188–196.

The theories of Chinese ophthalmology, as described to us by Dr. Pi, are amusing rather than instructive. It seems a little hard on a class of people who suffer much to read of them that "cataract is often seen in people who have bad temper." Before the day for cataract operation, a suitable hour is selected by the fortune-teller. The instrument used is a gold needle, one eighth of an inch thick and three inches in length; two-thirds of it are set into a bamboo handle and fixed there by wax or silver. The patient sits upright on a stool facing daylight. An assistant steadies his head. The patient is not allowed to shout or talk during the operation. The doctor is warned not to be nervous lest his hand should tremble. It is stated that needling is aimed at, though, to the reviewer, the likeness to the Indian procedure suggests that in some cases at least couching of the lens is attempted. A very extensive list is given of the things which the patient may not do on pain of failure of his operation. A very generous margin of protection to the surgeon's reputation is thus provided against the accidents which may befall the patient after such a procedure.

R. H. E.

KIRKPATRICK (H.). **Diseases of the Optic Nerve, as met with in the Government Ophthalmic Hospital, Madras.**—*Brit. Jl. Ophthalm.* 1920. June. Vol. 4. No. 6. pp. 271–275.

This is a very valuable contribution to Tropical Ophthalmology, and is an effort to tabulate the cases met with in the dark room of an Eastern hospital, with a view of contrasting what is found there with what is known under European conditions of work. The high proportion of optic nerve diseases is a very striking point, such diseases representing nearly half of all fundus cases seen in the hospital. Kirkpatrick divides his cases into four groups: (1) the actively inflammatory, (2) the post-inflammatory atrophies, (3) the primary atrophies, and (4) atrophies secondary to an inflammation of a very mild type, or to a post-neuritic inflammation. These last are far the most numerous of all. The causative factors are discussed: Consanguinity in the parents stands at the figure of 71·8 as compared with 60 as found in the general population. Pyorrhea, malaria, dysentery, quinine poisoning, venereal disease, blood changes and urinary conditions are all discussed in turn. The figures are taken from a total hospital attendance of 65,000 people.

R. H. E.

WOOD (D. J.). **Accommodative Failure in Malaria and Influenza.**—*Brit. Jl. Ophthalm.* 1920. Sept. Vol. 4. No. 9. pp. 415-416.

Wood saw, in 1918 and 1919, a large number of cases of malaria from what was then German East Africa, and observed two ocular troubles in very many of them, viz., inability to stand sunlight and inability to read. "After a bad attack the tenderness of the eyes to light lasted, as a rule, for about a week, but the difficulty in reading persisted longer—a month or so—if no second attack occurred to keep it going. Neutral tint glasses and an allowance for reading of a diopter, or sometimes more, were needed in a large number of the cases, where the men were well enough to go about freely."

After the virulent influenza epidemic which visited South Africa in October 1919 had passed, he began to get numbers of cases, where patients were unable to read, though they were quite able to return to work. The difficulty continued for many weeks, and recovery was slow. Loss of hair was a frequent concurrent symptom.

The failure of the ciliary muscle in these cases seemed to be out of all proportion to the severity of the general illness, and it persisted after the patient felt quite well again.

R. H. E.

CASTELAIN & LAFARGUE. **Du tétanos consécutif aux lésions oculaires.**—*Ann. d'Oculist.* 1920. Vol. 157. Jan. pp. 9-26.

The writers treated a case of tetanus after eye injury in a soldier, and in publishing the notes of their case, collected all the previous records, amounting to 23 in all. It has long been a matter of surprise to ophthalmic surgeons that in countries where tetanus is rife, India, for instance, it is so rare to find it as a sequel of eye injuries. The examination of the present records shows that in no less than 18 out of the 23 cases panophthalmitis was present. The first symptoms of tetanus appear to come on very early in eye patients; 18 out of the 23 died. In those who survived, the duration of the symptoms was about a month.

R. H. E.

MCPHERSON (G.). **Report on the Ophthalmic Work done in the Mesopotamian Expeditionary Force during 1917 and 1918.**—*Brit. Jl. Ophthalm.* 1920. Feb. Vol. 4. No. 2. pp. 64-75.

It is only possible to mention a few points in this very interesting paper. Excisions of the eyeball were performed under local anaesthesia, which proved a great advantage as the surgeons were very short-handed. No less than 19 operations for glaucoma were performed. In the acute cases, iridectomy was selected; in the others, Elliot's trephining with good results.

There were 255 cases of artificially produced ophthalmia in the two years; the agents used were jequirity, croton, or castor oil seeds. The former were the most popular. Any of these seeds can be purchased in the bazaar of an Eastern town. The action is similar in all, but that of the jequirity seeds is the most powerful, and that of the castor oil seeds the least. A small piece of the seed pulp is placed in the lower fornix, and allowed to stop there; very rarely the irritant is applied to the upper lid as well. Sloughing of the conjunctiva in contact with the seed occurs, and there is great redness of the corresponding lid and

chemosis of the neighbouring conjunctiva. An unilateral conjunctivitis, especially if it attacks only one lid and if it is accompanied by local sloughing of the conjunctiva, should always arouse a suspicion of malingering, and lead to the patient being very carefully watched. Even the fact that there is a coincidental sore on the penis should be discounted until after observation of the case, for some of the more thorough-going malingerers produce this sore in the same way.

In connection with night blindness, McPherson says, "if one suspects a case is not genuine, one might ask the man's C.O. to put him on extra day duty. I have known of outbreaks of night blindness disappearing rapidly under such treatment."

Of special interest to tropical practitioners is his observation that he has seen six cases of eye inflammation during his two years in Mesopotamia all caused by emetin from hypodermic syringes being accidentally introduced into the eyes of nursing sisters. The symptoms came on about 10 hours after the accident. There was slight swelling of the upper lid, injection of the bulbar conjunctiva, and marked photophobia. The cornea stained to fluorescein. Recovery was complete in about 10 days under fomentations and use of atropin.

Quinine amaurosis.—McPherson saw two cases of this condition; in one, a man of 25 received 20 grs. of quinine one day, and 10 grs. the next, with very serious consequences; in the other, a man of 47 was given 20 grs. of quinine bichloride one day and 10 grs. the next. He had serious general symptoms and his vision became very dim. He improved and his fields of vision were almost normal when he was last seen.

McPherson believes that the unnecessary use of dark glasses may lead to a strain on the accommodation and to troublesome headaches, which are relieved when the glasses are discarded.

R. H. E.

HARSTON (G. Montagu). **The Blind Sorrow of China.**—*China Med. Jl.* 1920. Sept. Vol. 34. No. 5. pp. 467-475.

Harston reviews some of the peculiarities of ophthalmic practice in China. What he has to say would apply equally to most Eastern lands. He comments first on the frequency with which cases of glaucoma come too late for operation, and to the great value of the Elliot trephine operation in sufficiently early cases. He considers that prophylactic trephining has a definite rôle in oriental practice. By careful attention to the technique which has been laid down, he has been able to avoid late infection in his practice. Syphilitic neuritis and consequent optic atrophy are common in China; so also is syphilitic uveitis. He looks on glaucoma and syphilis as the two great causes of blindness in that country. Taken with gonorrhoeal ophthalmia and trachoma, the four diseases cause 90 per cent. of all blindness. He has found silvol, in 10 per cent. solution, applied hourly, of great value in the gonorrhoeal cases. He speaks of trachoma as the greatest scourge of all, and says that at all ages, "the common, wet, household towel, used by all the members of the household indiscriminately among the lower classes of China" is the usual method by which the disease is spread. In China, as in India, trachoma is a mixed infection.

Harston makes a strong plea for the establishment of travelling ophthalmic hospitals in China under a Ministry of Health. A resolution to this effect was unanimously carried at the Conference at which this paper was read.

R. H. E.

FLEMING (Norman B. B.). **The Government Ophthalmic Hospital, Madras.**—*Brit. Jl. Ophthalm.* 1920. Vol. 4. pp. 555–557.

Fleming had the opportunity of visiting and working at the Government Ophthalmic Hospital, Madras, which is probably the best equipped ophthalmic hospital to be found anywhere, and which has, for many years, had a high reputation for the welcome it offers visitors. It is evident that Fleming has found that that reputation is still maintained, and those who read what he has written about this institution, will probably many of them feel tempted to make an effort to see it for themselves. What he says of its immense clinical opportunities, of its efficiency, and of its equipment, is certainly in no way exaggerated. A young ophthalmologist will probably learn more there in a month than he is likely to do at most other places in six months. Though Colonel KIRKPATRICK is no longer in Madras the traditions are ably carried on by his successor.

R. H. E.

MACCALLAN (A. F.). **Notes on the History of Ophthalmology in Egypt.**—*Bull. Ophthalm. Soc. Egypt.* 1920. pp. 64–66.

This fascinating little paper starts with a papyrus 34 centuries old, and written by the medical priests of the XVIIIth dynasty at latest. In this document, there is evidence that the writers knew of purulent ophthalmia and trachoma, as well as of many other eye conditions, inclusive of leucomata and trichiasis. From that time on the history of ophthalmology in Egypt is sketched in a light and attractive manner, illuminated by the names of Hippocrates, Herophilus, Euclid, Heliodorus, Celsus, Paul of Aegina, and others.

R. H. E.

MALARIA.

ITYENGAR (M. O. Tirunarayana). **Preliminary Report of a Malaria Survey of Calcutta and Environs.**—*Ind. Jl. Med. Res.* (Special Indian Science Congress Number, 1920.) pp. 8-17.

Although still incomplete this survey affords valuable indications of the risk of malaria to which Calcutta is becoming subject and of the means by which it can be combated. The freedom from malaria of central Calcutta, as contrasted with its prevalence in the suburbs, had long been familiar. This survey has, however, shown that *Anopheles stephensi* breeds freely in the cisterns which abound on the terraces of Calcutta houses for the purpose of storing the filtered and unfiltered water supplies of the city. The percentage of these tanks in which *Anopheles* breed varies from 12 in Amherst Street, 26 in Wood Street, 50 in Dharamtollah Street, 56 in Jamapukur Street and 62 in Clive Street. These figures show that neither at home nor at business is there any section of the community far removed from the breeding-places of these mosquitoes; while from the further facts that in an area of four-ninths of a square furlong in Dharamtollah 36 of these tanks were counted and that Calcutta covers an area of three-and-a-half by one-and-a-half miles, some idea of the magnitude of the problem is gained. *Stegomyia*, too, is widely spread. Just as Bombay had, in 1907-1908, an epidemic of malaria unprecedented in its history, so, it is felt, is there the risk that further importation of malaria-carriers, coupled with an increase in the anopheline factor, may produce at any time a similar epidemic in Calcutta.

The remedy is obvious, but its application difficult. Were the Calcutta water supply continuous the multiplication of storage cisterns would be unnecessary. They would cease to be built or used. The supply is intermittent because the city cannot or will not meet the expense of a continuous one. So long as the intermittent supply continues it is recommended that cisterns should be properly screened and inspected. But the difficulties of thus treating private houses, although not mentioned by the writer, will be clear to all with experience of India and, it may be added, can hardly be overcome until popular sanitary knowledge is greater and the popular sanitary conscience less modest than is at present the case in India; while the reckless waste of water which goes on in Calcutta renders a continuous water supply a hitherto unsolved administrative problem.

Clayton Lane.

PRATT-JOHNSON (J.). **The Distribution of Malaria in South Africa and a Mosquito Survey of Military Hospital Areas.**—*Jl. of Hyg.* 1921. Mar. Vol. 19. No. 4. pp. 344-349.

On information received from local medical men it appears that malaria is rare in Cape Province and Orange Free State; localised in Natal and apparently capable of elimination about Durban; prevalent in Eastern and Northern Transvaal, where it bursts out into occasional epidemics; endemic in Swaziland; neither endemic nor epidemic in

Basutoland ; endemic along the rivers of Bechuanaland ; endemic and liable to epidemic outbursts in Rhodesia and in the Belgian Congo. Except at Roberts Height malaria-transmitting mosquitoes have not been found in the military hospital areas in South Africa.

C. L.

MENDELSON (R. W.). **Malarial Fevers.**—*Milit. Surgeon.* 1921. May Vol 48. No. 5. pp. 581-583.

Although laymen, and indeed many medical men, still maintain that "In Bangkok we have no paludism, only up-country do you find it," a series of blood examinations has shown a 25 per cent. infection in Bangkok patients, many of whom are reported as having never been outside the city. Two cases of cerebral malaria are quoted in one of which the parasite, although looked for during life, was only found after death.

C. L.

HOSKIN (Jenner). **Five Hundred Cases of Malaria in Pensioners.**—*Brit. Med. Jl.* 1921. Apr. 2. pp. 493-494.

The results of the examination of 500 malarial pensioners from Salonica, Egypt and Palestine, and East Africa, lead to a consideration of the general elements which induced malarial infection in these three theatres of war. It is shown that the infestation figures coincide with years of mobility and they are explained by concluding that in stationary camps antimalarial measures can usually be effectively instituted, whereas for an army on the march this is impracticable.

C. L.

NICHOLLS (Lucius). **Malaria and the Lost Cities of Ceylon.**—*Indian Med. Gaz.* 1921. Apr. Vol. 56. No. 4. pp. 121-130. With 10 Illustrations.

There is here a fascinating historic survey of Ceylon, illustrated by beautiful photographs of sculptured rocks which reveal the high state of mental culture and bodily vigour which must have characterized the descendants of those Northern Indians who invaded Ceylon in the sixth century B.C. Their subsequent degeneracy is attributed to malaria. Since the evidence is all against any change in climate or water levels, it is assumed that malaria was a new disease introduced into Ceylon by the invaders, and one which attained its later virulence by the aid of the immense irrigation works which were inaugurated at that time. Since it is estimated that to rid Ceylon of malaria would cost Rs.10,000,000 annually, and since this is an impossible financial burden, it is concluded that it is necessary to accept the alternative of waiting until more is known regarding the factors which in the balance of nature work against the mosquito, and which, when known, can doubtless be swayed for the reduction of the pest.

C. L.

CLAYTON (Harry J.). **A Case of Malaria Infected in the Riverina, New South Wales.** (Pathological Investigation by Leslie Urz.)—*Med. Jl. Australia.* 1921. May 7. No. 19. pp. 382-384. With 3 charts in text.

The writers consider this to be the first case of autochthonous malaria reported in Australia south of Sydney, north of which place the patient had never travelled. As is usual in such circumstances the case was

very puzzling. As fever proceeded, her condition became most grave, with rigors, vomiting, coma vigil and dilated heart, but the lungs fortunately remained clear. After a process of diagnostic elimination the blood was examined and a heavy tertian infection discovered. Inquiry showed that there was swampy ground in her neighbourhood and that there had recently come to live near her house a man and his wife who had contracted malaria in the "Islands" and with whom she was friendly. Quinine had at first, on account of hyperemesis, to be given intravenously and rectally; later, administration was oral, with novarsenobillon intramuscularly. An addendum shows that certainly one, possibly two, other autochthonous cases have been observed in these regions; while an editorial deals with a case admitted to the Sydney hospital in 1915, in a man who had never been outside New South Wales, and urges the importance of an anopheline survey of the Commonwealth, and of the determination of the mosquito which acts as larval host for the malarial parasite in Australia.

C. L.

DOPTER. **Le Paludisme autochtone en France.**—*Ann. d' Hyg. Publique et Méd. Legale.* 1921. Mar. 4 Ser. Vol. 35. pp. 161–180.

In pre-war days malaria had nearly disappeared from France. The Great War proved no exception to the rule that malaria accompanies armies. The subject is dealt with in three sections. (a) Autochthonous malaria in the fighting zone. This first appeared in September, 1915, in Savoy, introduced by African troops into a region where *Anopheles maculipennis* flourished. It next appeared in Flanders, where it had been a scourge in the time of Louis XIV, and had indeed survived ever since in certain restricted localities. The Yser inundation gave it a fresh start and its presence was confirmed in that year in 22 French, 95 British, and in some Belgian troops. Another indigenous focus was similarly lighted up on the banks of the sluggish Seille, in 1915, and spread towards Pont-à-Mousson, in the Woevre and about Commercy. In 1917, inundations by the Germans gave rise to a focus about Noyon, where malaria had never been known. Another entirely new focus appeared about Berry-au-Bac, and yet another in Haulzy wood, between Champagne and the Argonne near the confluence of the Aisne and Tourbe. This furnished a number of cases. Others were reported from Verdun, Avocourt, Valelaincourt and Ancemont. The marshy environs of Troyes, free from autochthonous malaria since 1897, provided some cases. A new focus appeared in Southern Alsace. In 1918 a considerable focus appeared in Retortat, near Sezanne. The total cases to be reported from the military zone were 298. (b) Autochthonous malaria outside the fighting zone was noted sporadically at Vannes and Rennes; endemically at Beauce, in the Var and near Montpellier; and as a recrudescence in Brittany. During 1918 there were 198 autochthonous cases collected from these parts. (c) Post-war cases have occurred even in Paris.

A. maculipennis and *A. bifurcatus* appear to be the carriers in France, and June the most favourable month for transmission. The writer follows the common French practice of omitting a list of the literature to which he refers.

C. L.

LANZENBERG (A.). **Un cas de paludisme autochtone à *Plasmodium praecox***—*Bull. Soc. Path. Exot.* 1921. May 11. Vol. 14. No. 5. pp. 266-268.

PAISSEAU (G.) & LOUBRIEU. **Paludisme autochtone à *Plasmodium praecox***.—*Ibid.* pp. 268-273.

These papers add two to the number of autochthonous cases of subtertian malaria arising in France. Diagnosis rested on the detection of the parasite in the blood. The first was markedly anaemic with red corpuscles only numbering 2,700,000 per c.mm. and with the skin yellowish, suggesting cancer of the stomach. He improved greatly under quinine and was apparently cured, though subsequent information showed that he died later of a pernicious attack.

The second was another of those interesting cases in which the intravenous injection of novarsenobenzol lights up a latent malaria. The infection had evidently been acquired six months earlier and was now detected for the first time by the microscope. Disinfestation was only obtained with difficulty by intense cinchonization over a fortnight, followed by six intravenous injections of quinine and novarsenobenzol on alternate days. The writers comment upon the association, already noted, between syphilis and autochthonous subtertian malaria in France, six out of the thirteen cases having the double infection, and give a survey and welcome bibliography of these cases.

In a discussion which followed ROUBAUD added two further autochthonous cases of *P. praecox* [*falciparum*] infestation, one in a medical man, director of the Civil Hospital at Dieppe, and the other in a child.

C. L.

TIXIER (L.) & BIDOT (Ch.). **Un cas de paludisme autochtone chez un nourrisson de 4 mois.**—*La Pédiatrie prat.* 1920. Apr. 5. No. 1. [Summarized in *Gaz. des Hôpît.* 1921. June 21 and 23. Vol. 94. No. 49. p. 775.]

In a child under three years old, born in Paris and since living in the vicinity of the Military College, where carriers of the malarial parasite cannot be exceptional, there appeared fever on alternate days with restlessness, sweating, vomiting, blackish diarrhoea and great thirst. A month later the blood was examined and tertian parasites found. Treatment was with intramuscular injections of formate of quinine, the dose being 0.05 gm. Cure followed.

C. L.

FENDEL (H.). **Ueber zwei eigentümliche Fälle von Febris intermittens.** [Two Peculiar Cases of Intermittent Fever.]—*Muench. Med. Woch.* 1921. June 24. Vol. 68. No. 25. p. 771.

In two cases of quotidian fever occurring at Höchst-on-Main, which had never been in any region recognised as malarial, there occurred quotidian fever with rigors, sweating, enlarged spleen and anaemia. No parasites were found in the blood. Both cases were cured after taking quinine.

C. L.

GENOESE (G.). **Esantema scarlattiforme da malaria.** [Scarlatiniform Exanthem in Malaria.]—*Policlinico*. Sez. Prat. 1920. Aug. 9. Vol. 27. No. 32. pp. 858-859.

Various rashes simulating measles, erythema nodosum, urticaria, purpura, pemphigus, etc., have been described as occurring in the course of malaria. Such observations include some among children, though these are less numerous than descriptions of adult malarial exanthems, and are barely alluded to in the text-books of pediatrics. The writer describes a scarlatiniform rash which he observed in a child of six who was infected with malaria, as were also his parents and an elder brother.

When seen the child had been suffering from typical attacks of ague every two days for the last eight days. The rash was exactly like that seen in scarlet fever (minute punctiform type) and became intensely vivid during the fever. The distribution on the face was about the nose, mouth and chin. On the trunk it covered the whole of the back and was fairly obvious on the upper part of the thorax, fading as it descended to the abdomen. There was no rash on the thighs. A similar rash, though not so widely distributed, had been observed by the parents a week before the onset of fever. There was no sore throat, though slight desquamation was noted where the rash had been most intense. Its disappearance was not gradual, as in scarlet fever, but followed immediately the fall of the temperature. Cure was effected by three injections (0.50 gm.) of quinine.

Other cases of malarial scarlatiniform rash are to be found in the literature, from MORTON (1696), who describes a patient during the attack of fever with "*cutis rubedine intensa ubique perfundebatur*," to TARASCONI, who has described a somewhat similar rash in a patient aged 31 (*Policlinico*. Sez. Prat. 1909). [See also CHALMERS & INNES: this *Bulletin*, Vol. 11, p. 398.]

J. Rosslyn Earp.

RUSCA (Carlo Lamberto). **Per la casistica clinica della malaria: pernicioso con meningismo ed iposurrenalismo.** [Pernicious Malaria with Meningism and Hypoadrenalism.]—*Policlinico*. Sez. Med. 1920. July. Vol. 27. No. 7. pp. 256-272.

The writer describes a case which caused some difficulty in diagnosis.

S. E., a soldier, was admitted in the evening of September 6th, 1917, as an urgent case. The patient himself was semi-comatose, but the history accompanying him showed that hyperpyrexia had lasted three days. The patient had vomited the previous day. Since the beginning of the illness the bowels had been irregular. His health while in the regiment had been good until the present illness. The patient replied to repeated questions with slow staccato (not scanning) speech. Skin was bronzed, visible mucosa pale but not pigmented. Small, hard, mobile, painless glands were palpable in the neck and groins. The temperature was 103° F., the pulse 96, fine, regular, weak. The blood pressure could not be recorded. There was slight jaundice of the sclerotics, the tongue was furred, the breath foetid. Respirations thirty to the minute, signs of slight pulmonary emphysema. Examination of the abdomen showed meteorism, the spleen and liver palpable. Except for a brisk plantar response the reflexes were normal. There was no dermatographism. The urine contained traces of albumin and urobilin, hyaline and granular casts. The patient was put on light diet and treated by purgation and a stimulant injection. For the next three days the temperature varied between 100° F. and 103° F. The patient remained lethargic, Kernig's sign and headache appeared, vomiting continued. Spinal puncture was negative. The reaction of the pupils became sluggish. On the 10th the temperature rose to 103.5° F.

This was preceded by a slight rigor and followed by profuse perspiration. The following day a blood examination was made and some crescents and some small amoeboid forms were found. Quinine was administered (1 gm. intramuscularly). Next day the temperature fell below normal without amelioration of symptoms. The pulse was 120 and, in spite of the two injections of 1 mgm. each of adrenalin, remained weak. The patient, however, recovered sufficiently from his somnolence to give a personal history. This included the information that he had suffered at the age of thirty for about a year from malaria, which had always been tertian. Treatment with quinine and adrenalin was continued. On September 14th marked improvement was observed, and on September 19th the patient, whose improvement had been maintained under daily treatment with quinine, was removed to another hospital. His death was reported on September 23rd, with the note that the last three days had been remarkable for a progressive and extreme asthenia. At the autopsy the spleen was found enlarged and with a sub-acute tumour "probably malarial." There was hyperaemia of the meninges and oedema of the brain and ventricles. Both suprarenals were enlarged and caseous. No other signs of tuberculosis were found (unless an adherent pleura be so considered), nor was there any bronzing of the skin or mucous membrane. The tuberculous process in the suprarenals was "primary and evidently chronic." There was also acute parenchymatous nephritis.

The writer discusses the symptoms in this case at great length. He draws the moral that the symptoms of malaria may completely mask those of suprarenal insufficiency, while this insufficiency may suddenly become acutely serious through the added strain of malarial infection. In cases of pernicious anaemia with symptoms suggesting co-existence of adrenalin want, the possibility of a pre-existing and coincident tuberculosis of the suprarenals should not be forgotten.

J. Rosslyn Earp.

CRAIG (Charles F.). **The Classification and Differential Diagnosis of the Aestivo-Autumnal Malaria Plasmodia.**—*Amer. Jl. Trop. Med.* 1921. Mar. Vol. 1. No. 2. pp. 57-95. With 6 charts and 3 plates.

After pointing out that in infections produced by the direct inoculation of malarial blood the clinical features of, and the type of parasite found in, the new infection are invariably those of the form inoculated, and that throughout more than 100 mosquito experiments recorded in literature the same sequence has followed, Craig urges that proof of the plurality of species is practically incontrovertible, the three species being *Plasmodium malariae* Marchiafava and Celli, 1885; *P. vivax* Grassi and Feletti, 1890; and *P. falciparum* Welch, 1897. He urges that subdivision should go further, and that in the case of aestivo-autumnal malaria there are two forms with at least sub-specific rank, *P. falciparum*, Welch, 1897, and *P. falciparum quotidianum*, Craig, 1909, differing from one another (as do *P. vivax* and *P. malariae*) chiefly in the size and number of the sporozoites and the periodicity of sporulation.

In *P. falciparum* the earliest form noted is a hyaline motile ring or disc 2-3 μ in diameter, the rings differing from those of *P. vivax* in being broader at one part—having, that is, the signet-ring shape. Infection in a corpuscle is usually single, rarely more than double. In about eighteen hours the rings reach 3.5 μ and some pigment appears, generally in the thickened part of the ring. The ring shape is then lost, the parasite growing until it fills from two-thirds to three-quarters

of the erythrocyte. Pigment then collects in the centre and 10-30 (usually 18-24) merozoites appear. The erythrocyte is usually smaller, never larger, than the normal, and is of a slightly darker green colour than is usual.

In *P. falciparum quotidianum* the earliest rings measure $0.5\ \mu$, are motile, and are then apt to lose the ring shape. In two to four hours the rings have increased to a diameter of $1\ \mu$, do not have the signet shape and are unpigmented; double and triple infections of a single erythrocyte frequently occur, and even five or six rings may be observed in one corpuscle. The ring form is then lost and pigment appears, the parasite filling one-fifth of the erythrocyte. Its maximum growth reaches one-third or one-half of the diameter of the erythrocyte, which is shrunken, crenated and of a dark green olive colour. Twenty-four hours after infection of the erythrocyte the parasite gives rise to 6-18 (usually 12-14) merozoites, only $0.5\ \mu$ in diameter. Gametes are smaller by at least one-third, and plumper, than those of *P. falciparum*, both macrogametes and microgametes being kidney-bean-shaped rather than crescentic.

P. falciparum typically produces a fever which rises rapidly to 102° or 103° F., oscillates for several hours over about 1° , falls in a pseudo-crisis of 1.5° to 3° , rises often to a greater height than ever, and then falls rapidly to normal, the febrile period being 38 to 40 or more hours.

P. falciparum quotidianum typically produces an abrupt daily rise to 103° or more, followed after 8 to 10 hours by an abrupt fall to normal.

Atypical paroxysms are common in both cases.

Temperature charts, excellent when one has grasped that they represent not morning and evening, but three-hourly, temperatures, and very pleasing microphotographs, greatly strengthen the writer's contentions.

C. L.

BASS (C. C.). **An Attempt to explain the Greater Pathogenicity of *Plasmodium falciparum* as compared with Other Species.**—*Amer. Jl. Trop. Med.* 1921. Jan. Vol. 1. No. 1. pp. 29-33.

Bass (see this *Bulletin*, Vol. 17, p. 139) finds that when cultures of *P. falciparum* 36-40 hours old are placed under a cover on a slide and the cover is pressed by a delicate instrument the non-infected erythrocytes move freely back and forth, while those infected are motionless. He explains this on the supposition that the non-amoebic parasite is so firm and its size so considerable that it lifts the cover off the other erythrocytes. "The other species of parasite do not show this apparent firmer consistency." [Presumably it is intended to suggest that although appearing larger when the erythrocyte is seen from the side, these other species are flat and do not bulge it, whereas *P. falciparum* does so.] If this firmer consistence exist it will, it is presumed, check infected erythrocytes in the capillaries, infection of adjacent erythrocytes will occur and the capillaries become completely blocked.

C. L.

BROUGHTON-ALCOCK (W.). **Laboratory Observations on Latent Malaria in Soldiers returned to England, their Relation to Clinical Observations and the Value of the Large Mononuclear Cell Count. The Test for Quinine in Urine.**—*Jl. Trop. Med. & Hyg.* 1921. May 16. Vol. 24. No. 10. pp. 133–137.

This paper tabulates the results of blood examinations on 18,270 military pensioners who had served in places where malaria is endemic. Of these 777 were found infected, 759 with *Plasmodium vivax*, 14 with *P. falciparum* and 4 with *P. malariae*. The kind of film found most advantageous was a regularly-bordered thin one, evenly spread by means of a second slide or coverslip, and reaching neither the edges nor ends of the slide. Ear blood was discarded in favour of finger blood on the ground that the former contains in its first drop an "erroneous increased percentage figure in the number of the large mononuclear leucocyte." Taking 15 per cent. of large mononuclears as the upper limit of a normal blood, the writer's experience is that figures above this limit cease to be found within a few days of the institution of quinine treatment and that an excess over this limit is not a constant feature in latent malaria. Testing for quinine in the urine proved an efficient check on malingering.

C. L.

ESQUIER (A.). **La formule hémoleucocytaire dans le paludisme dakarais.**—*Arch. Méd. et Pharm. Nav.* 1921. May–June. Vol. 111. No. 3. pp. 227–229.

In 25 young marines infected with *Plasmodium praecox* [*falciparum*] blood counts of 500 leucocytes gave percentages of polynuclears amounting to 80 in seven, 75–80 in seven, 70–75 in six, 64–70 in five; while large and median-sized mononuclears varied apparently from 6–19·4 per cent.

C. L.

ZIEMANN (Hans). **Ueber wichtigere Probleme der modernen Malaria-forschung.** [Important Problems of Modern Malaria Researches].—*Berlin Klin. Woch.* 1920. July 12 and 19. pp. 659–663 and 687–690.

The most interesting problem dealt with in this paper is that of resistance to quinine. It is considered from two aspects (1) Can the human body become so used to quinine that the action of the drug becomes imperfect? (2) Do the parasites become resistant to quinine? Under the first, the question of malnutrition in its bearing on quinine treatment is mentioned, and under the second the author uses the term resistance to quinine as synonymous with virulence. If such resistance develop it will, he urges, be transmitted through the mosquito to the next generation; in which connection it is well to consider the work of the brothers SERGENT (see below).

He next passes on to the consideration of the establishment of quinine-resistant races of malarial parasites. He quotes BAUER as saying that in cases treated with quinine, strains of parasites are established which are so resistant; and his own previous statements that the virulence of parasites and the amount of quinine required to destroy them must vary with the "genius loci."

On such lines he divides parasites into A-parasites, an avirulent strain; V-parasites, a virulent strain; and A-V-parasites or bastard strains. The V-parasites he explains as having no quinine receptors or so many that they do not act. He assumes, that is, that quinine cures by combining with the parasites. There is further ingenious argument on similar lines, but it would have been wiser to have obtained proof that such combination occurs before proceeding to the elaboration of the theory.

C. L.

- (i) SERGENT (Etienne and Edmond). **Étude expérimentale du paludisme. Paludisme des oiseaux (*Plasmodium relictum*). I. Efficacité de la quininisation préventive. II. Moment où elle doit commencer. III. Races de *plasmodium* quininisées. IV. Essais de médicaments autres que la quinine. V. Essais de vaccination.**—*Bull. Soc. Path. Exot.* 1921. Feb. 9. Vol. 14. No. 2. pp. 72–77. [Discussion p. 78.]

- (ii) SERGENT (Etienne and Edmond). **Étude expérimentale du paludisme. (Paludisme des oiseaux à *Plasmodium relictum*, transmis par *Culex pipiens*).**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Mar. Vol. 1. No. 1. pp. 1–32. With 1 text-fig.

(i) These writers here continue the work already reported (this *Bulletin*, Vol. 17, pp. 307–308). If blood containing *Plasmodium relictum* be injected into uninfested canaries, and daily injections of quinine be begun simultaneously, there supervenes a latent malaria, symptoms being absent so long as quininization continues; nor does reinoculation during the course of the treatment produce any exacerbation. This effect is attributed not to the quinine but to the relative immunity, which other experiments have shown to be conferred under these circumstances, acquaintance with which is assumed. From the results of twelve experiments under varying conditions it is concluded that to administer prophylactic quinine before there is risk of infection is useless.

In one case only was there evidence of the development of a strain resistant to quinine, this character being retained in full during its passage through two other canaries, and, in lessened degree, through a third. It appeared in a canary kept quininized for nine months without symptoms, these then appearing in spite of the continuation of the quinine. In most cases quinine attenuated the virulence, since, after inoculation of blood from such cases, the illness produced was mild and only attained normal virulence after passage through one or two birds, or even three in a case in which one of the inoculations had been effected through the intervention of *Culex*.

Of drugs other than quinine *Marrubium vulgare*, salicin, colloid sulphur, emetine, arsenobenzol and cinnamon proved less satisfactory than quinine.

In the course of many vaccination experiments it was found that the inoculation of sporozoites, kept in vitro for 12 to 48 hours, produced immunity in 29·5 per cent. of 24 canaries; and the inoculation of blood, drawn during the incubation period after inoculation, produced similar immunity in 21·3 per cent. of 61 canaries; the normal immunity having proved to be 0·72 per cent. in 965 birds.

- (ii) This paper contains the experimental details of the work abstracted above and previously, and is the one which should be consulted by other investigators.

C. L.

BASS (C. C.). **The Standard Treatment for Malaria. A Discussion of Some of its Advantages.**—*Southern Med. Jl.* 1921. Apr. Vol. 14. No. 4. pp. 280–288.

The standard treatment of malaria adopted by the United States National Malaria Committee is explained and justified by Bass in this paper. The sulphate is recommended because it is cheap, well known, and slowly absorbed, so maintaining a certain concentration in the blood for a considerable time. It is given in doses of 30 gr. daily for three or four days, that being held to be the minimum amount which will check clinical symptoms. It is recommended that it should be given in divided doses of 10 gr. three times a day since this is less trying and seems as effective as the single dose. Except for rare emergencies intravenous injection is not recommended, because it saves but a few hours, introduces definite and occasionally most grave effects, is spectacular, requires special facilities and technique, and is not available for mass treatment. Intramuscular injection is not recommended because the quinine so given is absorbed into the circulation at a variable rate, because the injection may produce necrosis, is evidence of a failure to realise the feelings of the patient, is spectacular and requires special facilities and technique. If the few hours' delay in getting its effect are not important, oral administration is advised as being reliable, unspectacular, and capable of the widest use.

It is recommended that for eight weeks after clinical symptoms cease 10 gr. of quinine should be taken daily, not in the belief that this dose will sterilise all cases, but as an admittedly arbitrary means between this wished-for condition and an entirely inadequate course of treatment which will leave behind many carriers. The treatment advised has been found to disinfest in 90 per cent. of cases. The matter must be a rule of thumb one since by no known test can the moment of disinfestation in an individual be determined.

C. L.

ROWE (Ch.). **Komplizierte Malariafälle in Palästina.**—*Beitr. z. Klin. d. Infektionskrankh. u. Immunitätsf.* 1920. No. 4. [Summarized in *Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 3. p. 91.]

In chronic relapsing malaria no better results were obtained with 2.4 gms. than with 1 to 1.5 of quinine. Erythrocytes were not more affected in vitro by quinine solution in those who taken quinine or had had malaria for long. Sterilization is held to be partly the result of the formation of antibodies. In a case of malarial haemoglobinuria the kidneys were held to be the site of the haemolysis. The resistance of erythrocytes to quinine solution is not altered in blackwater fever. If malarial relapse and typhus co-exist, a further relapse will occur four weeks later.

C. L.

VERAS (Solon). **Malaria in Children at Smyrna.**—*British Jl. of Children's Diseases.* 1921. Jan.-Mar. Vol. 18. Nos. 205–207. pp. 1–11.

The writer analyses 88 cases of malaria, diagnosed apparently, partly clinically, partly microscopically, in children up to ten years old. He

prefers oral administration of aristochin or euquinine in the following doses :—

0 — 6 months	.. ..	0.1 — 0.15	gms. daily
6 — 12 "	.. ..	0.15 — 0.3	"
1 — 2 years	.. ..	0.2 — 0.4	"
2 — 5 "	.. ..	0.25 — 0.5	"

Intravenous administration he has not tried, but he considers rectal administration very uncertain, and hypodermic injection into the deep cellular tissue as the method of election, using 0.24–0.5 gm. for each injection. With esanofele, an Italian mixture of quinine hydrochloride, arsenic and citrate of iron, he has obtained good results.

C. L.

NEUMANN (Alfredo). **Esiste la possibilità di trattare le forme sessuate della malaria tropicale?** [Is it Possible to treat the Sexual Form of Tropical Malaria?]*—Policlinico. Scz. Prat.* 1920. Oct. 18. Vol. 26. No. 42. p. 1177.

In the Austro-Hungarian camp at Tirana from 1916 to 1918, the writer treated carriers of tropical malaria gametes with results shown in the following table :—

Treatment during three Days.	Blood Test after Treatment.		
	Positive.	Negative-Positive.*	Negative.
Quinine hyd. by mouth 2×1.5 gm... ..	35	11	7
Quinine urethane by subcutaneous injection, 2.0 gm	57	16	24

* First test negative, subsequent tests positive.

These large doses of quinine were followed by the usual prophylactic dose of 0.5 gm. quinine hyd. daily, and the patient was retained in hospital for at least a fortnight, during which three or four blood tests were made.

On seven occasions within an interval of 7 to 10 days, were found first a negative blood test, then a positive, and finally, after quinine treatment once more, a negative. He finds it difficult to reconcile these results with the theory supported by ZIEMANN, that quinine can only kill the young gamete in the internal organs and not the adult form in the blood stream. He concludes that the possibility that the gametes of tropical malaria are not always, and under all circumstances, quinine-resisting, is of more than theoretical interest.

J. Rosslyn Earp.

PITT (G. Newton). **The Intravenous Administration of Quinine in the Treatment of Malaria.***—Guy's Hosp. Reps.* 1921. Jan. Vol. 71 (Vol. 1. Fourth Series). pp. 21–25.

Without stating the number of cases on which his experience is based, the writer concludes :—

"With our present experience we may hold that the intravenous method is free from danger. It is far superior to the intramuscular and subcutaneous methods, and is to be advised in all serious cases where there

are cerebral symptoms or hyperpyrexia. It is valuable in obstinate relapsing cases, and it has proved of value in some cases of blackwater fever when there has been a fair secretion of urine. The usual dose is 12 grains of bihydrochloride of quinine in 12 cc. of saline solution, and it may in urgent cases be given three or four times in the twenty-four hours."

C. L.

DE BLASI (Alberto). **Il chinino e il bleu di metilene nella malaria.**

[Quinine and Methylene Blue in Malaria.]—*Policlinico*. Sez. Prat. 1920. Oct. 18. Vol. 27. No. 42. pp. 1177-1178.

The writer refers to REITLER's observation [this *Bulletin*, Vol. 15, p. 415], that methylene blue, by itself ineffective, reinforces the action of quinine in malaria. He himself published conclusions on the use of methylene blue as early as 1902 (*Gaz. degli Osped. e del. Clin.* No. 30). In this and in other publications cited, he has shown the efficacy of methylene blue used in conjunction with quinine, and has insisted on the necessity of using reliable pharmaceutical material. The difficulty in obtaining this is now greater than ever. He recommends the following pill:—

Quinine hydrochloride	..	..	..	cgm.	20
Citrate of Iron	..	..	..	..	2
Cacodylate of Iron	..	..	..	..	2
Medicinal methylene blue	..	..	..	..	5
Extract of quassia, gentian, eucalyptus, q s.					

Three or four pills to be taken at intervals of two hours during the forenoon.

MUSSÉOS has claimed that the ictero-haemoglobinuria of cinchonism may be distinguished from that of malaria by the administration of methylene blue, which will cut it short if due to malaria. The writer considers this test unreliable.

J. Rosslyn Earp.

KING (W. V.). **Natural Malaria Infection in Anopheles Mosquitoes.**—

Amer. Jl. Trop. Méd. 1921. Jan. Vol. 1. No. 1. pp. 35-39.

Of 5,673 *Anopheles maculipennis*, collected from negro tenant houses on a plantation typical of the Mississippi delta and from buildings occupied by negro convicts on the State penitentiary farm in Sunflower county, Mississippi, and dissected, the rates of infestation of stomach and salivary glands were 0.57 and 0.03 respectively. Great variations occurred in different seasons and at the different places, while parasite and spleen rates were equally variable.

C. L.

WESENBERG-LUND (C.). **Contributions to the Biology of the Danish**

Culicidae.—*Mém. Acad. R. Sciences et Lettres Danemark*. (Sect. des Sci.). 1920-1921. 8th Ser. Vol. 7. No. 1. pp. 1-210. With 21 plates and 19 text figs.

The most interesting part of this communication lies in its bearing on ROUBAUD's view upon the effect which animal houses have in guarding man from the attacks of *Anopheles maculipennis* and from the risk of malaria. The line of argument runs thus:—*Anopheles plumbeus*, *A. bifurcatus* and *A. maculipennis* are the species of this genus inhabiting Denmark. The last is the recognised species carrying European malaria, but in Denmark the writer has never found it wild. It hangs lethargic

and bloated from the ceilings of pigsties, cowsheds and stables, which it does not leave except for the purposes of mating and egg-laying. It can hardly be induced to bite man. These facts are in marked contrast to its vigour and voracity for human blood in Italy. Nevertheless, about a hundred years ago, appalling epidemics, attributed to malaria, occurred in Denmark. It is pointed out that it is during this same last hundred years that domestic animals in that country, instead of living in the open all or part of the year, have become consistent house dwellers; and it is suggested that malaria has disappeared from Denmark because there has arisen there, and perhaps there only, a stock of *A. maculipennis* with a marked preference for the blood of animals. It appears that with this change has gone an increase in size, since its present dimensions are not those which occur in the descriptions of 120 years ago, at which time the mosquito was, presumably, a man-feeder.

C. L.

FEDERATED MALAY STATES. **Malaria Bureau Reports.** 1920. Nov. Vol. 2. By HACKER (H. P.), M.D., B.Sc. (Lond.), Medical Entomologist, F.M.S., 47 pp. With 1 folding plan, 1 map, 1 chart, and 1 text-fig. 1921. London, Dunstable and Watford: Printed by Waterlow and Sons, Limited.

In the matter of nomenclature (for reasons shown*), *Anopheles rossi* variety *indefinitus* Ludlow, lapses as a synonym of *Anopheles vagus* Donitz, 1902; *A. rossi* Giles as one of *A. subpictus* Grassi, which has a new variety *malayensis*; *A. hunteri* Strickland as one of *A. separatus* Leicester; and *A. sinensis* Wiedemann as one of *A. hyrcanus* Pallas.

Since the method heretofore employed to classify breeding-places of Anophelines has depended on a personal enumeration of variable and varying characters, and since the classification of such descriptions has proved almost impossible in the past, it is now proposed that their classification shall be made by an enumeration of the various species which are found associated with any particular form. An examination of nearly 6,000 specimens indicated that only three species, namely *A. barbirostris*, *A. kochi*, and *A. vagus* bred alone. Each of these was—most unhappily—termed the type species of the corresponding group, the three groups comprising respectively (1) *A. barbirostris*, *A. hyrcanus*, *A. fuliginosus*, *A. aconitus* and *A. subpictus* var. *malayensis*; (2) *A. kochi*, *A. tessellatus*; (3) *A. vagus*, *A. maculatus*.

When, however, the number of specimens had increased to nearly 40,000 it was found that a species found alone does not bear the importance previously attached to it. Three pairs of species were, however, found in close association, each being the commonest associate of the other. These pairs were: *A. kochi* and *A. vagus*; *A. barbirostris* and *A. hyrcanus*; *A. aitkeni* and *A. leucosphyrus*. Thus when *A. kochi* was found, *A. vagus* was also found in 17·1 per cent. of cases; and when *A. vagus* was found, *A. kochi* was associated with it in 11·4 per cent. of cases. One is bound to add that in this case *A. hyrcanus* makes close running with percentages of 14·3 and 10·3 respectively; so that it cannot be considered unlikely that the second conclusion regarding association may also require modification. This possibility

* Inadequate according to ALCOCK in the case of *A. rossi* and *sinensis* [see this *Bulletin*, Vol. 17, p. 113].—Ed.

does not, however, alter the fact that classification by association eliminates personal impressions, enables past figures to be epitomised, and, when numbers are accumulated in sufficient quantities, should, when one species has been found, enable an opinion to be formed as to what others are also likely to be present ; and, should this opinion prove wrong suggest an investigation into the reason for this deviation from the normal.

Further observations seem to suggest that "Anophelines wait until artificial receptacles of water have approximated to natural conditions before they use them as breeding places."

A second report deals with a local epidemic of malaria on the bank of the Perak River, attributing it to the action of drought in allowing greater salinity of the water and the consequent development of *A. ludlowi*, the epidemic ceasing with the rains and the presumed lessened salinity of the water. [This strikes one as a sad deterioration from the days in which, as Kipling tells, Pau Amina the crab overwhelmed this river with his tides.]

The report ends with an investigation into the relationship of mangroves to malaria. None was found, the matter being probably a question of salinity ; malaria, however, scoring the first round by putting the investigators to flight before they could put the matter to the test.

C. L.

INGRAM (A.). **A Case of Spontaneous Rupture of the Spleen in a West African, with references to Recent Literature bearing upon Rupture of the Spleen, and Some Comments thereon.**—*Jl. Trop. Med. & Hyg.* 1921. June 15. Vol. 24. No. 12. pp. 164-167.

Based on the case of a Krooboy, aged 12, who died in his sleep from ruptured spleen without history or evidence of violence. The rarity of such cases reported in negroes, as compared with Asiatics, is considered ; and the experience of the writer and of DANIELS is mentioned as showing that the former rarely exhibit the enlarged spleens so common in the latter. This condition is explained on the ground that a constant infection during childhood occurs in negroes which produces a relative immunity to the strain of the malarial parasite concerned, although it is not explained how this can be supposed to act more effectively in the negro than in the Indian. The observation of PERRY, that in certain hill tracts in the Madras Presidency aborigines exhibit considerable infection in the peripheral blood without symptoms, whereas similarly-infected immigrants were severely affected, is cited, but it is not stated whether in the writer's experience similar tolerance, as opposed to immunity, exists in West Africa. The 36 references cited are mainly to English literature.

C. I.

GREVAL (S. D. S.). **Observations on Malaria. Part II.—Indian** *Med. Gaz.* 1921. Mar. Vol. 56. No. 3. pp. 85-89.

The conclusion of this paper is that in the febrile and non-febrile cases examined the incidence of [enlarged] spleen was higher in non-malarial than in malarial cases [it being assumed that where no malarial parasites were discovered none were or had been present.]

C. L.

- (i) FURUTAMA (T.). **A Case of Intestinal Hemorrhage coming from Malarial Fever.**—*Taiwan Igakkai Zasshi (Jl. of the Med. Assoc. of Formosa)*. 1921. Jan. 31. No. 214. English summary p. 6.
- (ii) MARUYAMA (Y.). **On the Recurrence of Malarial Fever connected with Typhoid Fever.**—*Taiwan Igakkai Zasshi (Jl. of the Med. Assoc. of Formosa)*. 1921. Jan. 31. No. 214. English summary, p. 6.

The official English summaries of these papers are as follows :—

(i) "Intestinal hemorrhage accompanying malarial fever, though mentioned in foreign reports, seems to have never been reported here in Formosa. The author now gives a detailed report on a patient whom he had under actual treatment, a young man of 20, Japanese born, who was first attacked by malignant malaria accompanied by jaundice and hemorrhage of the skin and mucous membranes, as well as a comparatively severe hemorrhage in the intestines."

(ii) "An occasional relapse of malarial fever after prophylactic inoculation against typhoid fever has been recorded by some investigators. The author had under his care four patients with a relapse of malarial fever while suffering from typhoid fever. According to his observations the question whether the typhoid toxin has any particular influence upon the relapse of malarial fever is to be answered in the negative, the relapse apparently being caused by the general decline in health."

C. L.

JOHNSON (J. Pratt). **The Diagnosis of Syphilis in Malarial Subjects by Wassermann Reaction.**—*Jl. Path. & Bact.* 1921. Apr. Vol. 24. No. 2. pp. 145-149.

In 74 cases of microscopically diagnosed malaria under quinine treatment there were seven positive Wassermann reactions which are assumed to indicate latent syphilis. Furthermore each case was tested about ten times in each of four laboratories, each laboratory using a different technique, namely, the original Wassermann method, Tschernogobouow's method, Flemming's method, and the Hecht-Fleming Method, and the percentages giving one or more positive tests were respectively 22, 6, 27, and 27, retesting giving positive percentages of 7, 6, 7, and 11 respectively. [It would seem that, at least in malarial cases, there is, under certain conditions, room for a possibly cynical scepticism when a positive Wassermann reaction is reported.]

C. L.

IYENGAR (K. R. K.). **Studies in the Value of the Wassermann Test. No. III.—Significance and Value of a Positive Wassermann Reaction in Malaria.**—*Indian Jl. Med. Res.* 1920. July. Vol. 8 No. 1. pp. 136-139.

Of 98 cases of microscopically diagnosed malaria the Wassermann reaction was positive in seven, all of which showed definite evidence of having had syphilis. Of these seven cases six had febrile attacks and were treated, receiving in two weeks 350 grains of quinine. Since their reactions remained unchanged it is concluded that neither quinine nor malaria affects this test.

C. L.

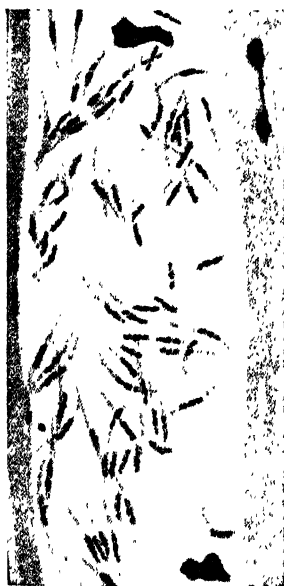
MAYER (M.). **Wanderung der Malariasichelkeime in den Stechmücken und die Möglichkeit der Ueberwinterung in diesen.** [Wandering of Malaria Sporozoites in the Mosquito and the Possibility of their Persistence through the Winter.]—*Med. Klin.* 1920. No. 50. [Summarised in *Arch. f. Schiffs-u. Trop.-Hyg.* 1921. Vol. 25. No. 2. pp. 64-65.]

In the autumn of 1919 Mayer infected a lot of *Culex* with the *Proteosoma* parasite to investigate the possibility of the infection persisting in the salivary glands through the winter. In a series of insects killed during the fifth week after the infective feed sporozoites were found in the salivary glands in great abundance, and also in all the muscles of the thorax, legs, and head, and whole bundles of them in the palpi. In a second series examined during the forty-eighth to fifty-second days after the infective feed, isolated sporozoites were found in the muscles and degenerated sporozoites in the salivary glands: no sporozoites were found in the ovaries.

A. Alcock.

MÜHLENS (P.). **Beobachtungen ueber das Verhalten der Malaria-parasiten in der Anophelesmücke.** [The Behaviour of Malarial Parasites in *Anopheles*.]—*Arch. f. Schiffs-u. Trop.-Hyg.* 1921. Vol. 25. No. 2. pp. 58-61. With 5 text figs.

Impressed by MAYER's observations upon the invasion of sporozoites into the muscles of *Culex* infected with *Proteosoma* and by the possibility of the persistence of infection through winter in this way, the



1. Sporozoites in a muscle space. ($\times 1500$)

(3342)

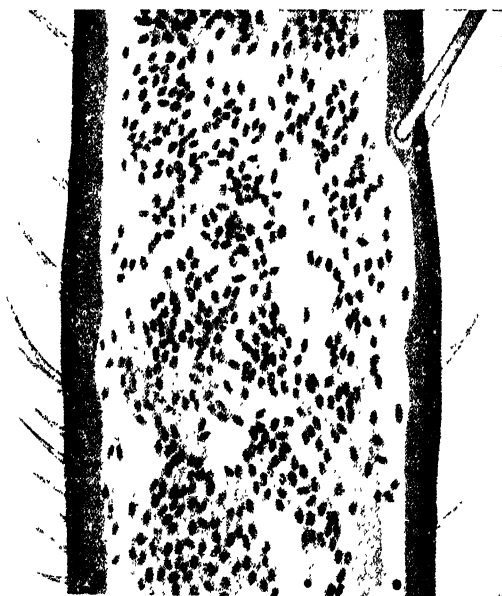


Fig. 4. Sporozoites in a palpus. ($\times 1500$)



Fig. 5. Sporozoites in the Scutellum. ($\times 750$)
 [Reproduced from the *Archiv für Schiffs- und Tropen-Hygiene*.]

author, on the 13th October, fed a batch of *Anopheles* on a case of benign tertian malaria, keeping the insects afterwards in a moist atmosphere at $23-25^{\circ}\text{C}$. Between the 3rd and the 5th November the insects were killed and sectioned.

Of eight *Anopheles* so treated six were found to be infected. No sporocysts were observed in the stomach wall in any case. In two of the insects the infection was so overwhelming that the author likens it to a septicaemia: sporozoites in great abundance were observed in the muscles of the thorax, legs, neck, and head; in the interstices, and beneath the epidermis, of the abdomen; in the heart and aorta; in the fatbody and in the vicinity of the ovaries—but not in the ovary itself; in the salivary glands, in a palpus, in the proboscis, and in a mass in the scutellum.

The author refers to the opinion of GRASSI—who found sporozoites in the epithelium of the "foregut"—that the sporozoites accumulate in the salivary glands soon after their escape from the sporocyst, an opinion which is contradicted by these observations. He concludes that the possibility of sporozoites persisting over winter in the muscles, palpi, and scutellum is a question that requires further investigation.

A. A.

NEUKIRCH (P.). Zur Kenntnis der Malaria der Kriegsteilnehmer. [Study of Malaria among War Personnel].—*Mediz. Klinik*. 1921. Apr. 19. Vol. 17. No. 15. pp. 452-253.

It is difficult to accept with enthusiasm a list of malarial complications and sequelae when one realises that malarial parasites were recognised in but three out of 107 of one set of the cases here dealt with.

C. L.

HELMINTHIASIS.*

STEWART (F. H.). **The Incidence of Worm Infection in Indian Troops of the Egyptian Expeditionary Force.**—*Brit. Med. Jl.* 1920. Oct. 16. p. 592.

During the six months from July to December, 1918, the faeces of 2,002 patients in No. 45 Indian General Hospital, Cairo, were examined. Practically all came from Palestine. The cases were partly selected as clinically suggestive of worm disease and partly taken at random. The total number of admissions to hospital during the period was 9,937, including those in the surgical division. Among those examined 28·3 per cent. showed hookworm infection, forming 5·7 per cent. of the total admissions, and in 6·8 per cent. *Ascaris lumbricoides* was detected, making 1·3 per cent. of the total admissions.

R. T. Leiper.

LABBÉ (Marcel). **Les vers intestinaux dans la pathologie du tube digestif.**—*Bull. Acad. Méd.* 1921. Jan. 4. Vol. 85. No. 1. pp. 16-18.

The author briefly summarizes the rôle of the common intestinal worms, *e.g.*, oxyuris, ascaris, trichocephalus, ankylostomes, tape-worms, in inducing irregular abdominal pains and alternations of constipation and diarrhoea, etc. A microscopical examination of the faeces should not be omitted in any case of long-standing dyspepsia.

R. T. L.

SEYFARTH (Carly). **Parasiten im Pankreas (Ascariden, Cestoden, Echinokokken, Distomen).**—*Cent. f. Bakt.* 1 Abt. Orig. 1920. Sept. 27. Vol. 85. No. 1. pp. 27-37.

The author has compiled with critical notes the bibliography of helminth invasions of the pancreas and has found in the literature 27 papers dealing with cases of Ascaridae, 24 papers on 40 cases of Echinococcus, 11 papers on 18 cases of flukes, and four papers on Cestodes which resulted in perforation of the duodenum and pancreas, and in one case in glycosuria. *Cysticercus cellulosae* has once been found in the pancreas by RAILLIET and MOROT.

R. T. L.

SCHWARTZ (Benjamin). **Hemolysins from Parasitic Worms: Preliminary Paper.**—*Arch. Intern. Med.* 1920. Oct. 15. Vol. 26. No. 4. pp. 431-435.

There is a difference of opinion among investigators as to the etiological significance to be attached to the presence of haemolysins in parasitic worms so far as the secondary anaemia of helminthiasis is concerned. The author has investigated some of the properties of these haemolysins to determine whether or not they resemble tissue lysins, and he concludes that as they are closely bound to cells of the parasites and may be liberated after thorough grinding of the worm material they partake of the nature of endotoxins. That they are liberated from the bodies of the parasites during life cannot be stated

* Professor LEIPER has not had the opportunity of correcting the proofs of this section.

on the basis of present knowledge, but the view that parasitic worms secrete toxic substances that are absorbed by the host not only affords a better explanation of the toxic symptoms of helminthiasis than the theory of "reflex action," but also provides an explanation of certain otherwise inexplicable aspects of the pathology of helminthiasis.

R. T. L.

CORT (William W.). **The Cercaria of the Japanese Blood-Fluke, *Schistosoma japonicum* Katsurada.**—*Univ. California Public. Zool.* 1919. Jan. 4. Vol. 18. No. 17. pp. 485-507. With 3 text-figs.

The cercaria of *S. japonicum* agrees with the cercariae of the two other species of human schistosomes, and it is difficult to discriminate clearly in morphological characters between these three species of cercariae. The adult structures of these cercariae are only slightly developed and adaptive larval characters for locomotion and penetration predominate. It is not possible to distinguish morphologically between male and female cercariae and the only trace of the reproductive systems which dominate the structure of the adults is a small mass of nuclei on the ventral side behind the acetabulum. The digestive system is in a very rudimentary condition. The mouth is situated on the ventral surface a little behind the anterior tip. A very narrow buccal cavity passes through the oral sucker. The oesophagus extends to about the mid-line of the body to widen into a heart-shaped structure representing the beginnings of the bifurcations of the intestinal caeca. The oral sucker has a length of more than one-third of that of the body. Its centre contains a large "reservoir"-like gland which seems to have some function connected with the penetration of the definitive host. The cephalic glands are unicellular with large nuclei filling almost all the posterior half of the body. The author counted five glands on a side. Their ducts enter the oral sucker in two groups. The glands and ducts occupy more than half of the total bulk of the cercaria, and appear to be homologous with the stylet glands of xiphidio-cercariae. The movements and activity of the cercariae on a surface are described in detail, and are correlated with the function of the cercaria as "primarily a machine for skin penetration, and its structure is completely dominated by those adaptive larval characters which make possible its penetration into the human host." Drawings giving clear and elaborate detail of the cercaria structure illustrate the text. The material upon which these subjects were made was received from Japan packed in dust, and upon arrival the snails appeared to be entirely dry and dead. They revived in water. The operculate forms can withstand desiccation.

R. T. L.

CORT (William W.). **Notes on the Eggs and Miracidia of the Human Schistosomes.**—*Univ. California Public. Zool.* 1919. Jan. 4. Vol. 18. No. 18. pp. 509-519. With 7 text-figs.

The internal structures of the miracidia of *S. mansoni* and *S. japonicum* are described and figured. A vitelline membrane surrounds the miracidium like a veil, and granules and oil globules are present in the intervening space. These globules were observed to be extruded

from the ducts which open on each side of the body between the cephalic region and the body proper. No evidence was obtained that these ducts were connected with the cephalic glands. The bursting of the shell seems to be due (according to the author's observations in *S. japonicum*), to the swelling caused by the action of the water, and not to any activity of the embryo. The cephalic glands in the miracidium of *S. japonicum* are smaller in proportion to the length of the body than in *S. mansoni*. Fewer germ balls are present in the posterior region than in *S. mansoni*. In two respects the excretory system of the miracidium of *S. haematobium* differs from that of *S. japonicum*. Looss shows all the tubules of *S. haematobium* to be of the same calibre and the capillaries of the posterior flame cells as much shorter than those of the anterior flame cells.

R. T. L.

SUYEYASU (Yoshio). [Course of Invasion of *Schistosomum japonicum* within the Body of the Host.]—*Kyoto Igaku Zasshi* (*Jl. of Kyoto Med. Soc.*). 1920. Jan. 20. Vol. 17. No. 1. pp. 43-60.

H. NARABAYASHI and Y. MIYAGAWA agree as to the course by which the cercariae of *Schistosomum japonicum*, after making their way through the skin of the host, reach the lung; but as to how they travel from the lung to their final place, the portal vein system, there is a great discrepancy between them. According to MIYAGAWA, the parasites are at first transferred by the pulmonary veins to the heart, and reach the portal vein through the body circulation; while NARABAYASHI is of opinion that they leave the lung along the bronchi and the wall of blood-vessels towards the lung hilus, then pierce through the loose tissue of the anterior mediastinum, and penetrating the diaphragm reach the liver.

The method of experiment adopted by the present author is as follows:—Infected snails were placed on the abdomen of mice, and were smashed, so as to let the parasites attack the new host easily. At intervals the mice were killed and examined carefully. The whole trunk was then cut in sections, and the parasites found in different parts were counted. By this method the author tried to follow the course of the parasites inside the body of the final host, and came to the following conclusions:—The cercariae which have penetrated the skin are transferred to the lung chiefly by the venous, and partly by the lymphatic, currents, and pass the right chambers of the heart. The young then leave the blood-vessels, penetrate the lung everywhere, come out into the thoracic cavity, reach the diaphragm along either pleura or mediastinum, then make their way through the diaphragm at any place into the peritoneal cavity, and at last penetrating into the liver, find themselves inside the portal vein. Such seems to be the course open to a majority of the young.

This agrees in the main with NARABAYASHI's result, but there is a difference in the channel from the lung to the diaphragm. On the other hand, the course as maintained by MIYAGAWA, if existent, cannot at least be the chief one.

● Hiroshi Ohshima.

PERRY (H. Marrian). **The Mechanism of Passage of Ova through the Tissues in Schistosomiasis.**—*Jl. Roy. Army Med. Corps.* 1920. Dec. Vol. 35. No. 6. pp. 487-488. With 1 plate.

FAIRLEY'S opinion that the sole function of the spine in the bilharzia egg is to enable it to pierce the venule wall, and that thereafter it plays no further part in the extrusion of the egg, is controverted in this interesting note. A microphoto is reproduced which shows that "the spine of the ovum must play an important part in the process of penetration and extrusion to the exterior. A lateral-spined ovum is to be seen lying in the tissues of the intestine, and the tract left by its passage is clearly evident. The actual stretching and severing of the connective tissue fibres in apposition to its point can definitely be observed; further, there is no marked accumulation of inflammatory cells in its neighbourhood, such as would be present had its movements been brought about by active inflammatory ulceration." The conclusion arrived at by the author is that "the migration of the ova through the tissues is largely dependent on a mechanical process in which the spines are an important factor."

R. T. L.

CAWSTON (F. G.). **Bilharzia-Infested Snails and their Employment as Antigen.** [Correspondence.]—*Lancet.* 1921. Jan. 29. p. 250.

At the season of the year in which the author writes (November) 1 in 6 *Physopsis africana* are infested with schistosomes, but only a small proportion of infested specimens harbour the parasite which causes disease in man, a greater number being infested with cercariae which develop into *S. bovis*. The author has found schistosome larvae in *Isidora tropica*, *Isidora forskali*, *Isidora schackoi jickeli*, *Physopsis africana*, *Limnaea natalensis* and *Planorbis pfeifferi*, but has not yet secured the adult forms of any besides *S. haematobium* and *S. bovis*. The antigen test, using *S. bovis* cercariae in liver of infected snails, was equally positive with *S. japonicum* and *S. haematobium*. The test was also positive with the serum of seven sheep that were known to harbour liver flukes.

R. T. L.

CAWSTON (F. G.). **Some Points in the Diagnosis of Bilharzia Disease.**—*Lancet.* 1920. Nov. 20. pp. 1045-1046.

Skin irritation is one of the first symptoms of bilharzia infection, and is frequently noted after bathing. During the succeeding few weeks there is a rise of temperature, bronchitis, urticaria, diarrhoea, abdominal pain, and there may be enlargement of the liver and spleen. A case is recorded in which there were indefinite symptoms, rise of temperature, and a skin rash of obscure origin and anaemia, some weeks after the patient had helped to find a pair of spectacles which had fallen into Till's brickfields at Durban. Later, ova appeared in the urine. The case cleared up after 16 days' course of treatment. In such uncertain cases of bilharzia infection the diagnosis may often be arrived at by the striking eosinophilia. A negative result was obtained by the antigen test in an early case.

It would appear probable that as much as three months may elapse before a patient notices any vesical symptoms. The first vesical changes are manifested by the presence of slight albumin in the urine

and some frequency of micturition. This bladder irritation may exist in patients who have no ova in their urine. Dr. LEIPOLDT considers that bilharzia infection is the probable source of a child's backwardness, and proposes a routine examination of the urine for ova whenever boys are behind their standards in endemic areas.

Bilharzic patients frequently show every indication of stone when none can be found. On operation such cases reveal much-injected kidneys and the presence of numerous bilharzia ova. The accumulation of ova in the vermiform appendix commonly produces attacks of appendicitis. Bilharzia disease is sometimes responsible for diffuse nervous conditions. A case is recorded where these and left-sided optic atrophy were associated with marked albuminuria and severe bilharzia infection. After a course of injections the "epileptic" fits disappeared. In Dr. MURRAY'S hands the antigen test has been of value to the author in elucidating several pathological conditions of obscure origin.

R. T. L.

NEVEU (R.). **Notes sur quelques cas de bilharziose vésicale et sur un cas de bilharziose intestinale observés pendant la guerre.**—*Rev. Méd. et Hyg. Trop.* 1920. Vol. 12. No. 2. pp. 35-36.

Notes are given of three cases of bilharzia infestation which occurred in the Senegalese regiments. They indicate the frequency with which the disease may be found in indigenous troops, and illustrate some of the more striking errors into which one may be led in diagnosis. Case (i) was diagnosed as one of traumatic haematuria. Case (ii) as "probably vesical bacillosis." Case (iii), a case of "haematuria." In all three cases microscopical examination of the urine revealed typical terminal-spined eggs of *S. haematobium*. The cases were all from Sénégal, one from St. Louis, the two others from the district of Mossi, Upper Senegal. A case of intestinal bilharziasis due to *S. mansoni* is also mentioned. The patient was for some time treated without success for amoebic dysentery.

R. T. L.

CHRISTOPHERSON (J. B.). **On the Action of Tartrate of Antimony in Intravenous Injections. The "Permeability" of Bilharzia Ova and Some Protozoal Organisms.**—*Brit. Med. Jl.* 1920. Dec. 4. pp. 854-855.

The drug appears in the blood-stream as antimony tartrate when given intravenously, and it does not seem to be necessary, therefore, in explanation of the action of antimony tartrate in bilharzia disease, to introduce the complicated picture of antibodies and indirect action on the parasite. That the bilharzia eggs are permeable is shown by the fact that the use of formalin as a deodorant in the examination of faeces sterilizes the bilharzia eggs, whereas the hookworm eggs are unharmed. If one-tenth of a cc. of urine laden with ova is diluted with 6 cc. of tap water at 130° F., the ova hatch out in from five to 10 minutes. If one grain of antimony tartrate is added before the hatching, about one-half hatch. The addition of about 2 grains of antimony tartrate to the 6 cc. just about stopped the hatching process altogether. From these and other experiments the author concludes that the drug has a profound and direct specific effect on bilharzia in all its stages.

R. T. L.

- i. ESSER (S. J. D.). **Emetine in Bilharziasis.** [Correspondence.] —*Brit. Med. J.* 1920. Oct. 23. p. 645.
- ii. BALFOUR (Andrew). **Emetine in Bilharziasis.** [Correspondence.] —*Ibid.* Oct. 30. pp. 681–682.
- iii. HARKNESS (A. H.). **The Superiority of Sodium Antimony Tartrate to Emetine in Bilharzia.**—*Ibid.* Dec. 11. p. 890.

i. Dr. Esser inquires on behalf of those who, like himself, are working in bilharzia-infested districts, if emetine is as efficacious as tartar emetic in bilharziasis, and if it can be satisfactorily given as an intravenous injection.

ii. Replying, Dr. Balfour gives a useful bibliography and a summary which shows that sufficient evidence has possibly not yet been adduced to warrant its substitution for antimony. The drug was given by intramuscular injection in doses which apparently varied from 1.54 gr. (0.1 gm.) to 3.08 gr. (0.2 gm.). The intravenous method of injection of emetine is unsuitable, as DALE has found that given in this way the drug exhibits its greatest toxicity, while there is no advantage in therapeutic efficiency. DIAMANTIS, however, records success in simple non-septic cases after 15 to 20 intravenous injections of 0.02 to 0.1 gm. at intervals of two or three days.

iii. Dr. Harkness, continuing the above discussion, records his own case, in which all recognized forms of treatment, including emetine, had been tried, and in which an apparently complete cure was eventually effected by the intravenous injection of sodium antimony tartrate. Dr. Harkness says he experienced no inconvenience during the course of treatment, and, in fact, owing to the exigencies of his profession, had to carry on his ordinary work throughout the treatment.

R. T. L.

TANON, CAMBESSEDES & PAMELA. **Un cas de bilharziose intestinale traitée par des injections d'émétique.**—*Rev. Méd. et Hyg. Trop.* Vol. 12. No. 3. pp. 65–68.

An infant, five years old, recently brought from Martinique, began to pass twice daily in recurring periods soft stools with some blood at the end of defaecation. The gradual change in the general condition and the anorexia and anaemia led to an examination of the faeces, and the lateral-spined eggs of *S. mansoni* were found. Intravenous injections of tartar emetic were instituted—a solution of 1 cgm. in each cc. The injections were made about every third day. First injection was $\frac{1}{2}$ cgm., the second, third and fourth were of 1 cgm. each, the fifth of 2 cgm. On the first day of treatment 30 eggs were found in six micro-preparations; only two eggs were found after the fourth injection. After this treatment the patient left the hospital, but six days later 25 eggs were found in the faeces, and an increased dosage of 3 cgm. in 1 cc. was commenced. Later a dose of 5 cgm. was followed seven days later by 7 cgm. without incident. Ten days after the last injection, however, the mother brought the child back on account of sickness and vomiting. A month later a pair of living adult bilharzia worms were found in the faeces. The female contained numerous eggs. At a later date a further stool examination was made and two eggs were found. The child's general health is reported as much improved, and there has been no further trouble either with digestion or with defaecation.

The author remarks upon the delayed symptoms of intoxication following the injection of $7\frac{1}{2}$ cgm. of tartar emetic.

R. T. L.

CAWSTON (F. G.). **Some Infections due to Freshwater Snails and their Eradication.**—*Jl. Trop. Med. & Hyg.* 1920. Nov. 15. Vol. 23. No. 22. pp. 274-276.

The freshwater fishes feed upon cercariae and "millions" are particularly useful. The addition of common salt to water is probably the best means of freeing green food, particularly watercress, of cercariae. Bilharzia cercariae and allied forms are quickly destroyed by Sir R. Ross's larvicide. Wild birds feed upon freshwater snails, but carry the eggs and minute snails upon their feet, but the domesticated duck keeps ponds remarkably free. A pond at Sydenham, which formerly was well-stocked with bilharzia-carrying snails, has been freed of them within a month by the introduction of three white ducks. Of prime importance is the constant removal of rushes, water weeds, lilies and floating sugar-cane from the rivers. Especial attention should be given to dams. The removal of infected pupils from the large missionary institutions near the sources of some of the South African rivers is advocated, and the prophylactic value of treatment is such as to warrant the organization of travelling hospitals for outlying districts.

R. T. L.

MAPLESTONE (P. A.). **A Note on *Hymenolepis nana* in North Queensland.**—*Med. Jl. Australia.* 1920. Oct. 23. No. 17. pp. 394-395.

The examination of a large number of centrifuged stools inaugurated with the hookworm campaign in North Queensland has revealed the occurrence of *Hymenolepis nana* eggs in a relatively large number of the inhabitants. Of 14,577 persons examined in 1918 by WAITE, 51 (*i.e.*, 0.35 per cent.) had *Hymenolepis nana*. During 1920 this worm occurred in 13 out of 72 inmates (*i.e.*, 18 per cent.) of the Townsville Orphanage. The differences in the figures is probably due partly to the difference in numbers examined, and to the fact that *H. nana* is more common in young children than in adults. Gastro-intestinal derangements, sometimes with various nervous signs, are common in children infected with *H. nana*, but in Australia so far no uncomplicated cases with symptoms have yet been observed. BREINL has made unpublished observations on mixed infections of *A. duodenale* and *H. nana* in Italians in North Queensland. Symptoms of gastric pain and discomfort persisted after the entozoal infections were eradicated. A remarkable case is quoted of a child of 10 years of age, apparently in perfect health, in whose stool eggs were found in large numbers. After a single treatment with *extr. filicis maris* over 1,000 worms were recovered from the stool.

R. T. L.

GOLDMAN (Alfred). ***Hymenolepis nana*; Possible Cercocystis Stage.**—*Arch. Intern. Med.* 1920. Sept. 15. Vol. 26. No. 3. pp. 373-380. With 2 text figs.

No case of infection with *H. nana* has been reported from the region of St. Louis, U.S.A. The seven cases recorded in this paper were seven children of a coloured family which came to that city in 1917 from Mississippi. In one of the cases which entered hospital on account of severe diarrhoea male fern was given but no worms

were passed, although two days before numerous eggs of *H. nana* had been detected in the faeces. The stools remained free from eggs for an interval of seven days. Treatment was renewed and at least 1,000 *H. nana* were obtained. The stools were again free from eggs until the thirteenth day, when many small circular bodies from 5 to 15 μ in diameter, and bounded by a thin membrane, were noticed. On the succeeding day, for the first time, *H. nana* eggs were observed with fewer of the smaller bodies. A few weeks later the stool was soft, yellow, bloodstreaked, and contained a large number of eggs. An eosinophilia of 2 to 3 per cent. occurred in those children without symptoms, while in those with definite symptoms it ranged from 6 to 9 per cent. The author fed eggs and mature segments to six mice and six rats without result. Attempts to develop the eggs by incubation in artificial gastric juice were also unsuccessful. Lice and bed bugs taken from the insanitary house in which the family lived were negative. There were no rats, but characteristic eggs are said to have been present in the faeces of a pet dog, although adults could not be found among the specimens of *Dipylidium caninum* and *Taenia serrata* recovered at post mortem.

The sac-like bodies passed after vermifuge varied in shape, being elliptical, ovoid, or approaching a sphere. Each homogeneous structure surrounded a head with four suckers and a hook-crowned rostellum. These are thought possibly to represent the cercocyst stage of the dwarf tapeworm. The occurrence of auto-infection is proved by the large number of worms present, and the difficulty in getting rid of them completely.

R. T. L.

SAEKI (Yoshihisa). [Experimental Studies on the Development of *Hymenolepis nana*.]—*Jika Zasshi* (*Jl. of Pediatrics*). 1920. Mar. 20. No. 238. pp. 203-244. With 28 tables and 4 plates.

Having obtained from time to time numerous supply of the eggs of *Hymenolepis nana* from a girl of nine years of age, the author made a series of experiments by feeding animals on these eggs. The results obtained with mice and albino and house rats were in most cases equally positive, while of the two young monkeys one was not seen affected.

About 10 hours after the eggs had been swallowed by the animals, oncospheres were found inside the slightly-destroyed papillae of the upper and middle parts of the small intestine. Cysticerci were formed after four days, and after five days the young could be seen freely inside the intestinal canal, mostly at the last portion of the small intestine. After eight days proglottid formation began. Genital organs could be made out after nine days. After 14 days full-grown proglottids were found filled with eggs within which oncospheres could be distinctly made out. After 16-17 days ripe eggs could be found in faeces. After a month or more the host became free from the parasite.

The author himself swallowed about 1,000 of the eggs at a time, but all his experiments, repeated four times, were failures. A similar experiment with a four-year-old girl proved successful. A few eggs were found in faeces after 19 days, and after 62 days, by use of the anthelmintic, 97 ripe worms were obtained.

Thus, both from experiments with the child and on some animals, especially the rats and mice, it is concluded that the infection of *Hymenolepis nana* is direct, without any intermediate host.

Hiroshi Ohshima.

Low (George C.) & O'DRISCOLL (Elizabeth J.). **A Case of *Dibothriocephalus latus* Infection.**—*Brit. Med. Jl.* 1921. Jan. 22. p. 118.

Imported cases of infection with the broad tapeworm are occasionally found in England. Recently a Finn, who had come to England in the course of his vocation, was admitted to the Seamen's Hospital, Greenwich, complaining of pains in the abdomen of an obscure nature. The case was diagnosed there, and an absence of eosinophilia noticed. As cases of this infection are rarely seen in England, he was transferred before treatment to the Hospital for Tropical Diseases for the purposes of study. The authors record their success in eliminating the parasite by administration of Filix mas extract in three doses of 20 minims at half-hour intervals followed three hours later by a saline purge.

R. T. L.

SURREL. **Kyste hydatique du poumon décelé par la radiographie.**—*Rev. Méd. et Hyg. Trop.* 1920. Vol. 12. No. 2. pp. 33-35. With 1 text fig.

A young girl, 20 years of age, who three or four days previously had some slight haemoptysis, was sent for radiographic examination to confirm the physical signs: modification of respiration at the left apex, increase in thoracic vibrations and in the vocal resonance, harsh respiration. The X-ray screen showed marked diminution in the transparency of left apex and some diminution also in that of the left sub-clavicular region. The transparency of the right apex and sub-clavicular region was normal, but there was seen at the level of the second rib and about 6 cm. to the right of the middle line a shadow of the diameter of a two-franc piece with smooth circular contour and uniform density. This shadow moved with the movements of the lung during respiration. These features suggested a diagnosis of hydatid cyst. The blood was then examined, and was reported as giving a feeble positive reaction to the complement deviation test of WEINBERG. The eosinophiles were more abundant than normal. No clinical signs were traceable to the cyst, which was revealed solely by radiography.

R. T. L.

- i. DÉVÉ (F.). **Cirrhose biliaire hydatique.**—*C. R. Soc. Biol.* 1920. Oct. 16. Vol. 83. No. 28. pp. 1263-1265.
- ii. ——. **Siège de l'orifice de communication des kystes hydatiques du foie ouverts dans les voies biliaires.**—*Ibid.* Oct. 23. No. 29. pp. 1306-1307.
- iii. ——. **La débacle hydatique cholédoco-vatérienne.**—*Ibid.* Oct. 30. No. 30. pp. 1338-1340.
- iv. ——. **L'élimination périodique prolongée des kystes hydatiques du foie dans les voies biliaires.**—*Ibid.* Nov. 6. No. 31. pp. 1366-1367.
- v. ——. **La débacle hydatique biliaire a-t-elle une valeur curative?**—*Ibid.* Nov. 13. No. 32. pp. 1384-1386.

i. In addition to those cases of chronic jaundice resembling Hanot's disease and the accidental association of hypertrophic biliary cirrhosis occurring with a hydatid cyst of the liver, there is unquestionably a cirrhosis of toxic origin from prolonged bile retention due to compression of the bile duct by hydatids. In such cases the author believes that surgical intervention may be beneficial if the obstruction can be removed thereby and the chief bile channels drained.

ii. The author differs from the accepted view that hydatid cysts commonly rupture into the bile duct and gall bladder. In 90 per cent. of his 140 cases the opening was into the intrahepatic biliary vessels—into the right hepatic biliary canal twice as frequently as into the left.

iii. The discharge of hydatid cysts of the liver in the bile passages gives a symptom syndrome characterized by (1) hepatic colic; (2) jaundice; (3) presence of hydatids in the stools; the last being the pathognomonic indication. The author analyses the observations of 76 cases. Hydatidemia occurred in 5 per cent. Hydatid discharge in the faeces was observed in 78 per cent. Hydatids both in the vomit and in the stool occurred in 17 per cent. As many as several hundred hydatids may be suddenly voided. The discharge is immediately followed by a cessation of hepatic pain and by a fall in the fever, sometimes with collapse and heavy perspirations. There is also a sudden decrease in the size of the liver or of the tumour where this has been made out. Almost immediately afterwards there was urticaria in seven cases. In favourable cases the jaundice vanishes with diuresis. The appetite and sleep return and the general health rapidly improves. This evacuation of hepatic cysts into the bile passage appears to be one of the most common methods of discharge, exceeded in frequency only by rupture into the peritoneum and into the thorax. The failure to recognize this condition is attributed to the neglect of sifting of the stools.

iv. That the repeated evacuation of hydatid cysts into the biliary passages may occur over a period of months and may result in cure without surgical intervention is illustrated by the author in one series of cases where the hydatids were found in the stool, and in a further series where the autopsies were obtained.

v. In this note the author deals with the question whether the spontaneous discharge of the hydatid cysts into the biliary passages, resembling as it does the vomiting of the hydatid of the lung, actually leads to a permanent cure. In 48 cases which had been left to their natural evolution there were 14 deaths. In only 12 cases the cure was verified several years later. At the autopsies occasionally a pocket was found still full of hydatids and communicating with the bile passages. Such lesions form a perpetual menace to the patient. The complications especially to be feared are the obstruction of the bile duct by the parasitic membrane and the biliary infection which often supervenes. Two complications merit especial note: (a) the suppuration, with gas production, of the original cyst (10 per cent. of cases), and (b) the opening of the cyst secondarily into the pleuro-pulmonary system (18·5 per cent. of cases). In spite of the apparent cures which arise the author advises surgical intervention where the diagnosis is well founded.

R. T. L.

CHAUFFARD, with LEJARS, RONNEAUX & BRODIN. **Diagnostic clinique et ablation opératoire d'un kyste hydatique calcifié du foie.**—*Bull. Acad. Méd.* 1920. Oct. 26. Vol. 84. No. 33. pp. 160–166. With 1 fig.

In the natural evolution of hydatid of the liver there is a somewhat rare clinical type in which a natural cure follows the death of the hydatid. The hydatid fluid is absorbed, and the cyst atrophies, eventually becoming a small calcified mass in the liver parenchyma.

Such a mass of parasitic origin is usually found at the post-mortem, but on rare occasions it may become the seat of infection, necessitating surgical intervention. The author gives the clinical history of a case in which secondary pericystic infection of a calcified hydatid of the liver supervened on an attack of influenza. In these cases radiography is of the utmost value.

R. T. L.

SHERWOOD (Walter A.). **Echinococcus Cyst of the Liver. Case Report.**—*Long Island Med. Jl.* 1920. Oct. Vol. 14. No. 10. pp. 377-380. With 2 text figs.

A tentative diagnosis of hydatid cyst was made in the case of a young woman, a native of Greece, who was admitted to the Brooklyn Hospital complaining of weakness, cough, and enlargement of the abdomen, which had steadily progressed in severity over a period of 16 months. The patient was emaciated, sickly looking, with pale sallow skin and pinched features. There was slight jaundice and a constant distressing cough. From the angle of the scapula downwards on the right side posteriorly there was absolute flatness. A large tense abdominal tumour protruded in the right hypochondrium and was evidently associated with the liver. There was no hydatid fremitus or fluctuation. The laboratory findings were negative. The differential count of the leucocytes was not suggestive. X-rays revealed an enormous tumour occupying the right side of the abdomen, crowding upwards to the level of the scapular angle the right half of the diaphragm. Two operations were done. In the first the tumour was exposed through the right rectus muscle, and five quarts of pale limpid fluid were removed by trocar and canula. The wall of the cyst was totally removed, and was found to show the typical laminated and hyaline structure of an echinococcus cyst, with a few daughter cysts adherent to the surface. Further X-ray examination revealed the persistence of a dense shadow below and above the diaphragm. At the second operation the upper part of the right lobe of the liver was exposed by the transpleural method of approach; portions of the seventh and eighth ribs having been removed in the posterior axillary line. A secondary cyst containing daughter cysts was removed and communication was made with the site of the first operation, thus establishing thorough drainage. Although the patient's condition improved, the physical signs suggested the accumulation of fluid in the pleural cavity, and large quantities of foul-smelling pus were removed on two occasions by aspiration. Later the persistence of cough, fever, and the expectoration of foul-smelling muco-purulent material suggested the development of pulmonary abscess, which was drained. Thereafter recovery was progressive and uneventful.

R. T. L.

GINSBERG (Louis). ***Strongyloides intestinalis* Infestation : Report of a Case.**—*Jl. Amer. Med. Assoc.* 1920. Oct. 23. Vol. 75. No. 17. p. 1137.

Infestation with *Strongyloides intestinalis* or *stercoralis* rarely occurs in the northern part of the United States. Its geographical distribution follows closely that of the hookworm. The author reports a case from Johnstown City Hospital, Pa. The patient was native-born, and had lived her whole life in the western part of Pennsylvania. The

symptomatology of the illness, which is attributed to the strongyloides infection, is detailed. There was swelling of the feet, followed by headache, and later by swelling of the hands. Diarrhoea was a constant feature. The stool was dark green and fluid, with six to 12 evacuations a day. The temperature was about 102° F., the pulse frequent and feeble, and the respirations rapid and laboured. There was a red-streaked sputum, with an annoying bronchial cough. The sputum was not examined microscopically. The urine was dark, scanty, and foul-smelling. A few days before death defaecation and urination became involuntary. There was no eosinophilia. Active motile worms were seen with the low power of the microscope. The worms measured 0.7 to 1 mm. in length, and the oesophagus had a double dilatation. "There were three small curved spicules at the base of the tail." Dram doses of glycerin four times a day were administered, followed by thymol. A necropsy was refused.

R. T. L.

WILLIS (H. Hastings). A Note on the Value of Oil of Chenopodium in the Treatment of Strongyloides Infection.—*Med. Jl. Australia*. 1920. Oct. 16. No. 16. pp. 379–380.

During the hookworm campaign in the Lower Burdekin area near Townsville, Queensland, 60 persons out of 223 examined for hookworm were found to harbour strongyloides although in good health. Oil of chenopodium was administered in 0.06 mil for each year of age up to 20 years, and 1.5 mil for adults. The treatment, given as a single dose on an empty stomach, was followed in an hour by a purgative dose of magnesium sulphate. There was no preliminary purgation. The treatment was repeated after seven days. Forty-eight persons were so treated. A fortnight after the second treatment neither eggs nor larvae could be found in the stools, and the same result was obtained at a later examination made six weeks after the administration of the second treatment. From these observations the author concludes that oil of chenopodium is an efficient vermifuge for strongyloides infestations.

R. T. L.

FENNELL (Robert F.). "Further New Zooparasites of Man." [Correspondence.]—*Jl. Amer. Med. Assoc.* 1920. Aug. 28. Vol. 75. No. 9. p. 625.

The statement that the newly discovered viviparous parasite *Rhabditis hominis*, reported from Seoul, differs in at least one respect from *Strongyloides stercoralis* (i.e., that the ova are found in the faeces in the latter infection) is questioned by the author of this note, who has over a long period of years never seen the *Strongyloides stercoralis* ova in the stool. [The adult stages have since been figured, however.]

R. T. L.

- i. TAMURA (Harukichi). [On Creeping Disease.]—*Hifu-Ka oyobi Hinyōki-Ka Zasshi* (*Jl. Dermat. & Urol.*). 1919. Oct. 20; Nov. 20. Nos. 10 & 11. pp. 827–834; 891–910. With 3 plates.
- ii. FUJITA (Hidekazu). [A Case of Creeping Disease (due to ? *Gnathostoma*).]—*Ibid.* No. 10. pp. 835–837.
- iii. IKEGAMI (Yutaka). [On the Cause of Creeping Disease.]—*Ibid.* No. 10. pp. 838–846.

i. A married woman who had lived for years in China (Tien-tsin and Hankow), aged 41, suffered from a creeping disease. On the right side of her breast a curved, and afterwards branched, linear

swelling was observed. It measured 4.5 cm. in length, 1-2 mm. in breadth, and was raised 1 mm. above the level of the skin. The colour was yellowish-white, except at one end, where the patient felt a pain intermittently; this part was intensely red in colour. The author was successful in digging out a worm with a needle, and a small portion of the affected skin was then removed and examined by means of cutting sections. A continuous tunnel was found to have been formed, partly running through the epidermis and partly deeper, its floor reaching the corium. The worm was blood-red in colour, 9 mm. in length and 1 mm. in diameter. The disc-like anterior end was provided with eight transverse rows of hooks. The anterior half of the body was covered with minute scales, while the remaining part was naked and strongly coiled at the hind end. There is hardly any doubt that the worm was a male of *Gnathostomum*, much resembling *G. siamense*.

After briefly describing 38 foreign and five Japanese recorded cases of creeping disease, the author proposes to classify them into seven forms according to their symptomatic differences.

ii. A case of creeping disease was observed in a Chinese. He was 32 years old, born in Canton, and came to Hankow two years ago. Starting at the middle line of his breast, a linear swelling extended towards both sides, and at the end of two weeks it was found running nearly transversely from the left arm-pit to that of the right side, then bending upwards, to end at the distal end of the clavicle. The total length measured 77 cm., and its broadest part was 2 cm. in breadth. From examination by means of sections the author could not make out any trace of a tunnel or of a parasite.

iii. The patient was a 50-year-old Japanese who had lived in Formosa for 21 years, and recently came to Amoy. The swelling was found on the belly, starting a little above the navel, running towards the right side and upwards, meandering as it ran, and forming three tubercles in its course. The total length measured 21 cm., the breadth 1-1.5 cm. The first part was of a yellowish colour, the last (the end of the right side) light red, while the middle portion was dark red. The author secured a parasitic worm which he picked out with a needle from the pale white spot at the centre of the swollen, light-coloured end. The pain disappeared soon after the removal of the parasite.

The worm was young, probably referable to *Echinorhynchus sphaeroccephalus*, but there was a structure like the alimentary canal, the presence of which suggests its belonging to *Gnathostomum*. The length of body measured 2 mm., diameter 0.4 mm.; colour, light brown-yellow. Anteriorly the body ends in a proboscis beset with five rows of hooks, each row consisting of 15-25 hooks. Proboscis sheath, lemniscus (?) and bursa copulatrix could be distinguished.

Hiroshi Ohshima.

ROCKEFELLER FOUNDATION. INTERNATIONAL HEALTH BOARD. **Hook-worm and Malaria Research in Malaya, Java, and the Fiji Islands. Report of Uncinariasis Commission to the Orient, 1915-1917.** [DARLING (S. T.); BARBER (M. A.); HACKER (H. P.)].—191 pp. With 97 text figs. 1920. New York City.

The Commission was appointed "to determine to what degree *Uncinaria* infection is a menace to the health and working efficiency of the people in the country under consideration." The intimate

relation found to exist between malaria and hookworm disease as disabling factors made it necessary for the Commission to devote almost as much time and study to malaria as to hookworm disease, in order to determine the relative importance of the two infections as causes of anaemia. The findings concerning hookworm are as follows : The determination of hookworm by vermifugal treatment is more accurate than by microscopical examination. Where a percentage of 80 was obtained by the method of examination for ova there is little doubt that a percentage of 90 or more would have been obtained by the method of treatment. Experiments designed to test the relative efficacy of various methods of treatment led to the conclusion that "chenopodium in small doses proved to be more efficacious than small doses of thymol." While, dose for dose, both drugs showed about equal efficacy in removing Necators, chenopodium was quite superior in removing Ancylostoma and also other worms, *e.g.*, Ascaris and Trichocephalus. There was failure to remove all hookworms in 23.6 per cent. of the cases treated with thymol, but in only 7.6 per cent. with those treated with chenopodium. Better results are obtained from chenopodium when it is given in the original form of an oil than as an emulsion. Better results are obtained from thymol when the drug is especially prepared in an emulsion than when it is administered in the form of a powder. The half maximum dose of chenopodium (0.5 mil three times, or a total of 1.5 mils, *i.e.*, $1\frac{1}{2}$ cc.) is, in the experience of the Commission, the best treatment as a routine, for while it does not have the toxic effects of the full dose it was found that it will, in two treatments, remove about 99 per cent. of all the worms present. The efficacy of chenopodium continued high even when the dose was reduced to one quarter of the maximum, while the diminution of the dose of thymol rapidly affected its efficacy.

The relative cost of these treatments was estimated. That of chenopodium is less than one-half as much as the equivalent treatment with thymol. The after-effects of treatment, such as dizziness, unsteadiness of gait (drunkenness), inability to rise, semi-comatose state, tingling of hands and feet, deafness, burning in the stomach and headache were more complained of after the use of chenopodium than after treatment with any other vermicide. Giddiness was always experienced, usually after the second dose, by all persons and was more marked among men than women. The more severe symptoms very rarely followed chenopodium used as an emulsion ; only one out of 175 persons so treated complained of deafness. When the oil was given in capsules, from 16 per cent. to 20 per cent. complained of deafness. Among the immediate after-effects of treatment by vermifugal drugs is a temporary fall or net loss in haemoglobin and in erythrocytes. In anaemia cases both haemoglobin and erythrocytes mounted almost immediately after treatment, and within a week would return to normal.

Experiments upon purges, *e.g.*, compound mixture of senna (2 oz.), castor oil ($1\frac{1}{2}$ oz.), magnesium sulphate (1 oz.), calomel (4 gr.), indicated that these had little or no effect on the value of vermifugal treatments.

The various kinds of hookworms differ in their resistance to a given dose of vermicide. Necators are less resistant than Ancylostomes, and the males are less resistant than the females. The resistance appears to increase also with the size of the worms. These differences become less marked as the dose is increased. It is easier to remove a high percentage of worms when there are many worms present than when there are few.

A racial difference between Tamils and Chinese was apparent from the work done at the District Hospital at Kuala Lumpur. While Tamils harboured many worms and suffered severe anaemia there was no record of mortality, although they harboured almost as many hookworms as the Chinese and their haemoglobin was nearly as low. This "racial" difference in severity may possibly be due to the fact that the *Ancylostoma duodenale*, which the Chinese harbour in larger numbers, inflict more serious wounds in the mucosa than the *Necator*.

At Viti Levu (Fiji), hookworm infection was found to occur in 100 per cent. of the adult male Indian and Fiji populations. *Necator americanus* and *Ancylostoma ceylanicum* were found in native Fijians living in remote districts out of contact with Indian sources of infection. In them *Ancylostoma duodenale* was never present. A statistical study is made of the "hookworm species formula according to race," and it is considered that the ankylostome index possibly affords a clue to the ethnic origin or composition of the natives of Malaya, Java, and the other Islands of the Netherlands Indies, and that a high *Ancylostoma duodenale* formula indicates a large admixture of ethnic stocks from Northern India or elsewhere.

In a study of haemoglobin standards in relation to race, age, and sex, many interesting facts are brought out. It was found that age influences the normal haemoglobin values, not merely during adolescence, but during the entire period of life, so that a different value must be assigned to each decade. There is a very marked difference between the haemoglobin values of normal men and women, averaging among Tamil coolies about 10 per cent. higher than among the women. The effect of pregnancy on the haemoglobin is very striking, and is especially noticeable in the later months, often amounting to as much as 15 per cent.

In the Federated Malay States so much malaria was found that it was quite hopeless to estimate the relative importance of hookworm and malaria in the causation of anaemia. From studies based on small areas—e.g., in Suva, where malaria was absent—the data obtained indicated that in regions where hookworm infection is uncomplicated by malaria persons may harbour a considerable number of worms without showing any measurable degree of anaemia. In the higher grade of hookworm infection, where the number of worms mounted into hundreds, a given number of worms caused a certain degree of anaemia. In such cases it was concluded that in places like mid-Java eight worms in a boy and 12 worms in a man may cause a haemoglobin reduction of one degree. This can be measured where the average worm-counts of the boys are over 100 and of the men over 200. Hard labour and sub-nutrition are undoubtedly strong factors for accentuating the anaemia of people suffering from either malaria or hookworm. Attention is drawn to a series of cases in which severe malaria (cachexia), with anaemia, oedema, and debility, give rise to the wretched physical condition which practitioners and laymen usually diagnose as cases of ankylostomiasis.

R. T. L.

ROYER (E. Ray). **Hookworm and Other Intestinal Parasites in Ecuador.**

—*Jl. Amer. Med. Assoc.* 1920. Dec. 18. Vol. 75. No. 25. pp. 1702-1705. With 2 text figs.

As a result of a survey of the employees and dependants of the mines of the South American Development Co., which are located

in Portovelo, near Zaruma, in the Ecuador Andes, at an altitude of 2,000 ft., it has been found that hookworm disease is very prevalent, and that both *A. duodenale* and *N. americanus* are present. "*Trichocephalus dispar* and *Ascaris lumbricoides* are found in a large percentage of the population, and diarrhoea and subsequent anaemia are not unusual sequelae." Chenopodium was ineffective against the whipworm, which occurred in 84.5 per cent. of 1,109 cases under observation. The author questions whether there is "a specific toxin generated in pulmonary tuberculosis which is inimical to the development of hookworm in a host so affected." While the average infestation was found to be 58.66 per cent. of the employees surveyed, no hookworms occurred in 46 employees suffering from tuberculosis, though other parasitic worms were present in about the usual number.

R. T. L.

YOSHIDA (Sadao). **A New Course for Migrating Ancylostoma and Strongyloides Larvae after Oral Infection.**—*Jl. Parasit.* 1920. Sept. Vol. 7. No. 1. pp. 46-48.

The course of the migrating larvae of ancylostoma and strongyloides is essentially the same after skin and oral infection in the two genera. Sooner or later the larvae migrate into the lungs by the blood-vessels or lymph system, and the majority pass through the trachea, oesophagus and stomach to the intestine, but a few reach the intestinal wall direct by the pulmonary vein and systemic circulation. Although this is now recognized universally, it appears from the author's researches that there is another subsidiary route. Larvae introduced into the alimentary canal may appear in the abdominal and pleural cavities at least 24 hours later, and may penetrate into the liver, pancreas and lungs. Strongyloides larvae smeared on the shaved skin of the abdomen may appear in the abdominal cavity or in its viscera in about 24 hours by piercing directly through the abdominal wall. Some of the larvae apparently invade the pleural cavity directly by piercing the oesophagus, but the more common and usual course is for the larvae, after piercing the intestinal wall, to migrate through the diaphragm from the abdomen to the pleural cavity. The presence of strongyloides larvae, reported by FÜLLEBORN, in the liver and kidneys is attributable to direct invasion from the abdominal cavity.

R. T. L.

LANE (Clayton). **The Mass Treatment of Hookworm Infection.** [Correspondence.]—*Lancet.* 1920. Sept. 25. pp. 673-674.

A reply is made to the contentions of Dr. DARLING that the diagnosis of ankylostome infestation by microscopical examination of the faeces as now carried out in hookworm campaigns is expensive, time-consuming, and untrustworthy, and that (disinfestation by anthelmintics being impossible and unnecessary) promiscuous treatment is all that is needful. It is contended that "the benefits which can, at least temporarily, be conferred upon hundreds of millions of persons, should not be withheld because our methods are admittedly imperfect; so long as it is clearly recognized that they can only be temporary

and correspondingly costly." Meanwhile, research must be urgently pressed towards (a) the determination of the best method of mass diagnosis of eggs in the stools; (b) the production of a drug which will, without risk to the host, remove all hookworms at a single dose; (c) the designing of a cheap, effective, sanitary and fool-proof latrine suitable for a large family in the tropics.

R. T. L.

YEN (F. C.). **The Control of Hookworm Disease at the Pinghsiang Colliery, Ngan Yuen, Kiangsi.**—*Nat. Med. J. China*. 1920. June. Vol. 6. No. 2. pp. 71-92. With 2 charts.

This report is chiefly of interest as representing the first work of any size which has been undertaken hitherto to control hookworm infection in China. The campaign was conducted under the auspices of the International Health Board, and conformed in essentials to those in operation elsewhere. Of the underground workers, 18,608 were examined, and 56.79 per cent. were found infected, while in 51.925 per cent. of the 3,553 surface employees the findings were positive. The company has now formed a permanent Sanitary Department to look after all matters pertaining to sanitation. Provision has been made for toilet facilities underground. On the surface new latrines have been constructed. The collection and transportation of nightsoil have been organized. To preserve the fertilizing value of the nightsoil, pits of brick lined with cement were constructed, each with a capacity to store all faeces collected in a month. It has been found, however, that live larvae were present in one of the pits after nine months of storage. A résumé of the difficulties encountered, and of the results achieved, is related in a concluding paragraph.

R. T. L.

MINAGAWA (Kôki). **[Preventive Experiments on Hookworm Infection.]**—*Tokyo Igakkai Zasshi (Jl. of Tokyo Med. Soc.)*. 1919. Nov. 5. Vol. 33. No. 21. pp. 1099-1115. 2 plates.

The use of nightsoil as manure as generally practised in Japan necessitates a thorough disinfection to prevent the propagation of any endoparasitic worms. One of the most effective and inexpensive ways of disinfecting nightsoil is known to be the mixing of urine with it. When either eggs or young of the canine hookworm are subjected to the action of human urine, they cannot develop further and at last die out. The author has tried to furnish experimental proof of this. Some small areas of ground were impregnated with dogs' faeces, which was left for 10 days after being either (1) mixed with human urine, or (2) mixed with water. Young dogs were then moistened, and put in these areas for four to 24 hours. After eight to 22 days the dogs were killed and examined. The dogs put on the soil which had been impregnated with faeces simply mixed with water became very heavily infected, while the other lot which had been in contact with the soil treated with human urine had only a few worms, at most 26 in number. Some pathological features in the dogs affected, both severely and only slightly, are further described.

• Hiroshi Ohshima.

STEWART (F. H.). **Life-history of *Ascaris lumbricoides*.**—*Brit. Med. Jl.* 1920. Nov. 27. pp. 818-819.

In a preliminary note to a paper shortly to appear in *Parasitology* Stewart records the results of some recent experiments on three-day-old sucking pigs. Four pigs were fed with ripe eggs of *Ascaris suilla*. All suffered from ascaris pneumonia on the seventh and eighth days after infection. One died during the night of the 7-8th. The remaining three pigs were killed on the 15th, 17th and 19th days, and larvae measuring from 3 to 7 mm. in length were found in the small intestine. The larvae, which still required to undergo a further moult before becoming adult, were embedded in abundant mucus. The intestine was in a condition of catarrh. It is "extremely probable that the worm can undergo full development in one host alone—that is, man or the pig."

R. T. L.

BOURGES (Henry). **Syndrome d'ictère hémolitique acquis au cours d'une lombricose. Rôle pathogénique des toxines ascaridiennes dans la genèse du processus de destruction globulaire.**—*Bull. et Mém. Soc. Méd. Hôpît. de Paris.* 1920. Dec. 9. No. 37. pp. 1491-1494.

A case of jaundice is recorded as attributable to infection with *Ascaris lumbricoides*. The patient was a young soldier who was admitted to hospital for anaemia, weakness and splenic hypertrophy, and with a history of recurring attacks of fever. The blood examination on admission showed 7 per cent. of eosinophiles. As two specimens of *Ascaris* were passed spontaneously, santonin was given for three days. Thirteen worms were evacuated. At intervals of eight days a further series of santonin doses was administered, and 14 worms were passed. The patient thereafter gradually improved. The pallor diminished, and the yellow tint of the conjunctiva disappeared. The globular resistance of the red blood corpuscles increased, and the blood count now gave 4,455,000 red cells and 10,000 white corpuscles in place of 3,350,000 red and 16,000 white cells on admission. The reduction in the red cells, which disappeared after santonin treatment, could only be attributed to the absorption of the toxins of the *Ascaris* worms, as there were no signs of other recognized cause, e.g., tuberculosis, syphilis or malaria.

R. T. L.

AMARAL (Afrânio). **Filariose de Bancroft.** [Bancroft's Filariasis.]—*Mem. Inst. de Butantan.* São Paulo. 1918-19. Vol. 1. No. 2. pp. 89-166. With 16 plates. [English summary, p. 161.]

From the author's summary in English one gathers that the following are the chief points of interest in this long and well illustrated paper. The filariasis due to *F. bancrofti* is endemic in Brazil, chiefly in the northern and central states. In Bahia the filarial index is about 9 per cent. Periodicity is probably "a factor of a larger nightly issue of toxin by the adult worm. The embryos in the blood are agglomerated by the extremity of the tail by means of hydrohemolysis." Morphologically the embryos can be differentiated from all other embryos of filariae by the presence of a central viscus. "The inflammatory and obliterating lesions of filariasis are determined by the presence of the

adult parasites in the lymphatic system, by their eggs, and may be on a larger scale through their own toxic products." Mechanical causes favour the stagnation and extravasation of lymph, which, continuing to form in the tissues, increases the pressure of the lymphatic "vases," thus complicating the lesions of the disease. Besides inflammatory forms of the disease, there are reasons for including anaphylactic manifestation, *e.g.*, pernicious lymphangitis. The adult worms may cause abscesses. Elephantiasis may be produced exclusively by the *Filaria bancrofti*. There are grounds for distinguishing a form of lymphatic extravasation and one of chylous extravasation. Filariasis has a haematology characteristic of (a) the apyretic period—reduction of neutrophile polymorphonuclear leucocytes, with an increase of the micro-lymphocytes at night and an increase in the eosinophiles. (b) an absolute increase in the leucocytes, an increase of the neutrophile polymorphonuclear leucocytes, with reduction of the micro-lymphocytes and a diminution or absence of the eosinophiles, which return before the access of fever has passed.

Surgery may radically cure certain very old and troublesome results of Bancroft's filariasis, but the best therapeutic treatment for such parasitism seems to be radio-therapy.

R. T. L.

TANON (L.) & GIRAUD. **Traitement des filarioses sanguines par les injections sous-cutanées d'hectine.**—*Rev. Méd. et Hyg. Trop.* Vol. 12. No. 3. pp. 82-86.

Hectine, first tried by one of the authors in 1910, appears from further experience to be of real efficacy in the treatment of filarial infections, especially those due to *Filaria bancrofti*. It has certain advantages over tartar emetic and other preparations, *e.g.*, those of iodine. It is easy to use and is quite harmless. It results in cure, at least in some cases observed by the authors. In three cases quoted the hectine was given by the same method as in syphilis, *i.e.*, an injection of 0.2 cgm. under the skin of the arm every second day for a period of 20 days. After an interval of 10 days a second series of injections follow. A third series is given after a similar interval. To complete the course of treatment, after a month has intervened, two further series of injections are given in the course of a month. After the third injection the general health of the patient is much improved. The eosinophilia vanishes and the blood count becomes normal after two or three months. Fever and other symptoms entirely disappear. In elephantiasis, massage and bandaging, with electrical treatment and possibly the use of fibrolysin may be necessary.

R. T. L.

LOW (George C.) & O'DRISCOLL (Elizabeth J.). **Further Researches upon Antimony in the Treatment of Filariasis.**—*Lancet.* 1921. Jan. 29. pp. 221-222.

To a single case previously published by LOW and GREGG, the authors add two further cases in which 17½ gr. of tartar emetic injected intravenously over a period had no effect whatsoever on the number of embryos circulating in the blood. The details of the blood analysis are carefully tabulated, and in one of the cases it is pointed out that there was an almost complete disappearance of the embryos from

the blood when no treatment was being given. At this time there was no lymphangitis, and the embryos reappeared after four days. Emetine, which was given for a concurrent amoebic infection, was similarly without effect on the filaria embryos. The total amount of tartar emetic given was 31 gr. in one case and 18 gr. in the second.

R. T. L.

CHARLES (E.). **Removal of Filaria from under the Conjunctiva.**—

Indian Med. Gaz. 1920. Oct. Vol. 55. No. 10. p. 378.

SEWELL (R. S.). **Note on Mr. Charles' Specimen.**—*Ibid.*

Under cocaine a worm was removed from "a fairly large swelling on the inner and lower side of the right eye beneath the ocular conjunctiva" in a native of Sialkot district near Jammu State Territory, India. The swelling followed the onset of pain of a neuralgic type which subsided at night when it was cold and increased in the daytime. Major Sewell reports that the preserved specimen, measuring 33 cm. in length and 2 mm. wide, was a female *Filaria*, in all probability of the species *F. conjunctivae* Addario.

R. T. L.

MACFIE (J. W. S.). **Tartar Emetic in Guinea-Worm Infections.**—

Ann. Trop. Med. & Parasit. 1920. Nov. 27. Vol. 14. No. 2. pp. 137-146. With 1 chart in text and 1 plate.

To the note of 10 cases of guinea-worm treated with tartar emetic which the author published earlier in 1920 some further observations have been added, and details of a few new cases are given which bring the total number of cases recorded up to 23 and the number of worms to 39. The paper also summarizes the results. Excepting on rare occasions the tartar emetic was administered intravenously in doses of 1 gr. every other day. The effect of the injection was to kill the adult worms and the embryos within them. The effect of the drug varies: most frequently the worms remain in the body and are gradually absorbed; in other cases the worm appears in the wound it has previously made, when it can be extracted easily, or portions may slough before the wound is healed. The effect of the drug in reducing inflammation is very notable. The inflammation of the affected limb and the discharge from the guinea-worm sore appear to respond immediately to the intravenous injections. There is undoubtedly a reduction in the duration of the illness and the liability to more serious consequences which attends other forms of treatment. In many cases 4 gr. in all suffices to kill the worms and the embryos. The author advises a total dose of 6 gr., as all guinea-worms are not equally susceptible.

R. T. L.

HOOKWORM CAMPAIGNS (1918).*

Salvador (1918). †

Hookworm relief measures were carried on in the Departments of San Salvador, La Paz, Cascatlan, La Libertad, Sonsonate, Santa Ana and Ahuachapan. At the central office in San Salvador city

* For 1917 see this *Bulletin*, Vol. 14, pp. 165-178.

† Report (No. 7,457) on Work for the Relief and Control of Hookworm Disease in Salvador, by Dr. C. A. BAILEY.

many school children, amongst others, were examined and treated as the result of an order of the Minister of Public Instruction which directed that all school children should present a certificate from the Department of Uncinariasis showing freedom from hookworm disease before being admitted to school. The strictly intensive plan followed during the previous two years was modified in the operations conducted in 1918. Specimen containers were distributed and treatment administered at the laboratories only. By this revised method the Department of Uncinariasis, without enlarging the field force, examined more than two and a half times and treated more than three times as many persons in 1918 as in 1917. The virulent influenza epidemic in Salvador towards the end of 1918 was a retarding factor in the work of the year.

Anthelmintics used were chenopodium and thymol. The opinion is expressed that chenopodium is preferable, as it is more readily taken. The bulk of the drug, when encapsulated, is much smaller, it does not produce as severe a reaction, and it has secured a somewhat higher percentage of cures with two treatments; further, a first treatment with chenopodium preceded by a strong purge expels a larger number of *Ascaris* than a similar treatment with thymol—a strong consideration in inducing the people to undergo prolonged treatment.

Other Parasites.—Of the 67,787 persons examined in areas completed from the beginning of the work in 1916 up to the end of December 1918, 73·8 per cent. were found to harbour *Ascaris*, 39·5 per cent. *Trichocephalus*, and 1·6 per cent. *Strongyloides*. *Taenia* (species undefined) occurred in 1·2 per cent. In addition 301 persons were found infected with *Oxyuris*. These figures are not intended to give an accurate index of the relative incidence of infection, as thorough examinations were made for hookworm only.

Sanitation.—The National Sanitary Code provides ordinances for the construction, maintenance and proper use of latrines, but unfortunately the ordinances are not enforced. A sanitary survey begun in all the towns where work has been conducted showed that of 14,964 homes inspected, 1,041 had latrine accommodation on first inspection, which was made at the time curative work was in progress in the various areas. At the time of the second inspection, made in the course of the 1918 sanitary survey, 3,506 homes were found to have latrine accommodation.

Panama (1918). ‡

The work is under the medical direction of Dr. W. T. BURREs, but during his absence for the greater part of the year Dr. J. L. RICE personally supervised the campaign. During 1918 operations were completed in Dolga and Boquete districts of the provinces of Chiriqui, in Macaracas, Poeri, Las Tablas, Pedazi and Los Santos districts of the province of Los Santos, and at the Red Cross Clinic in Panama city. The district of David, where work had been closed in 1916, was reopened in 1918 because patients belonging to that district constantly appeared at the laboratories of surrounding districts in search of treatment, which they had previously declined. A preliminary survey

‡ Report (No. 7,466) on Work for the Relief and Control of Hookworm Disease in Panama, by Dr. W. T. BURREs.

was also made early in the year in the five principal towns of the province of Veraguas, viz., Atalaya, Santiago, San Francisco, La Mesa and Rio de Jesus.

Mode of Campaign.—The Department of Uncinariasis conducts all work of examination and treatment according to the dispensary method. This method has been adhered to throughout Panama as best suited to meet the social and topographical conditions of the country. The persons examined, in areas completed during 1918, numbered 16,185, of which 84.4 per cent were found infected. First treatment was administered to 87.6 per cent. of those infected, and of those treated 35.8 per cent. were pronounced cured upon microscopical re-examination.

Anthelmintics.—Both thymol and chenopodium were used during 1918. The dosage of thymol was 3 gr. for each year of age up to a maximum of 60 gr. This dose was given in two equal parts, with an interval of two hours. There was a preliminary purge of magnesium sulphate, and a second purge was given two hours after the second portion of thymol. The dose of oil of chenopodium was reduced to 30 minims, and this was administered only to fairly robust adults. As with thymol, this dose was given in two equal parts, with an interval of two hours between the doses.

Other Parasites.—Of the 93,286 persons examined for hookworm between 1914 and 1918, *Ascaris* infection was detected in 40.1 per cent., *Trichocephalus* in 20.2 per cent., and *Strongyloides* in 2.7 per cent. *Taenia* (spec. indet.) in 203 cases, and *Oxyuris* in 126 cases were also noted.

Haemoglobin Index.—The results of 9,297 haemoglobin examinations made during 1918 show an index of 58 per cent.

Sanitary Improvement.—The spirit of indifference with which the people of the small towns and the rural areas of Panama meet all efforts toward sanitary reform in their communities has greatly hindered progress in this branch of the work. The type of public latrine now being installed in Panama is a concrete structure of the cement-lined pit variety. This is practically indestructible, and is so constructed that it can be converted at any time into the septic tank or the flush variety of latrine without moving the house or destroying the pit.

Census	16,185
Examined	13,656
Found infected	11,966
Given first treatment	4,286
Cured	

Nicaragua (1918).*

In the following areas intensive work was completed during 1918: Nandasmo, Catarina, Niquinohomo, San Juan and Mazatepe of the Department of Masaya; and Boaco, La Libertad, San Lorenzo Juigalpa, Teustepe, Santo Domingo, Santa Lucia, San José Remalis, and the Babilonia and Esmeralda mines, all situated in the Department of Chontales. In several areas the straining of stools formed an important part of the educational campaign. As many as 4,000 worms were obtained from a single individual, and in highly-infected cases

* Report (No. 7,465) on the Work for the Relief and Control of Hookworm Disease in Nicaragua, by Dr. D. M. MOLLOY.

it was not unusual to collect from 750 to 1,000 worms after a single treatment. The demonstration of these heavily-infested stools was of inestimable value as educational propaganda. In rural districts it is difficult to get the average inhabitant to submit a specimen for examination, and as practically the only non-infected persons in such areas are the very young and the very old, treatment could profitably be administered to all who present themselves. After four treatments, the maximum number usually necessary to effect a cure, a patient could, for campaign purposes, be considered hookworm-free.

Summary of Results.—In the areas completed during 1918 the number of persons examined was 19,786. Of these 75.9 per cent. were found infected, and first treatment was administered to 91.1 per cent. of those found infected.

Anthelmintics used.—A mixed treatment, consisting of 60 gr. of betanaphthol and 20 gr. of thymol was used almost exclusively throughout the greater part of the year. The former drug was given in two equal parts with an hour's interval between the doses and the latter drug in one dose an hour later. Very satisfactory results are reported from the use of this combination. Chenopodium in freshly-filled capsules proved more efficacious than when administered unencapsuled in combination with sugar. In one laboratory it was found that an addition of 25 per cent. by volume of chloroform appreciably increased the efficacy of the chenopodium. The dosage for an adult patient consisted of 30 minims of chenopodium and $7\frac{1}{2}$ minims of chloroform; for children the dose was graduated according to age.

Other Parasites.—Of the 19,786 persons examined for hookworm, 79.4 per cent. were found infected with *Ascaris*, 54.5 per cent. with *Trichocephalus*, and 3.4 per cent. with *Oxyuris*. In addition 243 persons harboured *Strongyloides*, and *Taenia* was detected in 145 persons.

Latrines.—In all areas the latrines installed were of the pit-type, provided with a stone or cement curb reaching about 5 ft. below the surface of the ground and serving as a foundation for the building. The depth of the pit is as great as conditions permit, varying from 6 ft. in the low ground to 20 or 30 ft. in high ground. Where a shallow pit is necessary the other dimensions are increased proportionately and the curbing is built from the bottom of the pit and is carried 2 or 3 ft. above the surrounding surface. A mound of earth sloping outwards to a distance of 15–20 ft. is built around the curbing, and a circular ditch is dug two or three yards distant from the circumference of the mound.

*St. Lucia (1918).**

Measures for the control and relief of hookworm continued during 1918 under Dr. Stanley BRANCH under the supervision of an Advisory Board having the same personnel as the Board of Health of the colony. Prior to 1918 intensive operations were completed in the Cul-de-Sac Valley, the Castries Valley, and the Union Girard areas.

During the first half of 1918 the campaign spread northwards and ultimately enveloped the remaining $12\frac{1}{2}$ square miles at the western end of the island. The Gros Islet area was completed on April 30. Towards the end of February operations were also begun in the

* Report (No. 7,443) on Work for the Relief and Control of Hookworm Disease in St. Lucia, by Dr. Stanley BRANCH.

"Roseau-Rayé-Millet" area, which covers about 17 square miles of territory, and embraces three well-marked valleys—Roseau, Millet, and Anse la Raye. This was terminated on December 31.

Infection with Other Parasites.—Of 5,004 persons examined for hookworm during 1918, *Ascaris* infection was noted in 33·6 per cent., *Trichocephalus* in 5 per cent., and *Strongyloides* in 3·5 per cent.

The chief *anthelmintics* used during these campaigns was thymol in 10-gr. capsules, and the dose was increased to a routine of 50 gr., or even 60 gr. for adults. In and around the village of Gros Islet oil of chenopodium was used exclusively because of the greater prevalence of round-worms in the village. With the chenopodium 72 per cent. of the cures eventually recorded were effected after one treatment, while thymol was effective to a similar degree in 67·7 per cent. of the cases eventually cured.

Sanitation.—It is stated that "it will require years of hard educational effort to overcome the natural instinct of the inhabitants of St. Lucia to defaecate wherever inclined." Gros Islet village has two latrines built over the sea. They are kept clean and in good condition, and are used exclusively by males of all ages. The pails, or "pots de chambre," used in the houses are carried down to the beach at night, and at an appointed spot are emptied and cleaned. Dirty utensils are kept in or under the living rooms until they are emptied. There are no pit latrines in the village, and only a few out-buildings of the pail type. Apart from the village there are 140 inhabited houses in Gros Islet area. The sanitary conditions at Roseau during 1917 were unspeakably bad, but there was improvement during the following year. Fifty-five new portable latrines were erected for the various settlements. The village of Anse la Raye has two public latrines erected over the sea, and these are used exclusively by males. The beach is the common latrine. The school latrine is a considerable distance from the school and has no accommodation for boys. Although erected in July it had not once been used up to December. Earth closets are furnished by the colony for free distribution among the peasantry.

Census	5,036
Examined	(99·4%) 5,004
Found infected	(62·5%) 3,126
Given first treatment	(92·5%) 2,892
Cured	(71·5%) 2,068
Removed from area (or dead)	(6·8%) 212
Remaining in area uncured	(27·1%) 846
(a) unclassified	(4·2%) 131
(b) refused	(13·5%) 423
(c) medical reasons	(1·0%) 31
(d) under treatment	(8·3%) 261

St Vincent (1918).*

Prior to 1918 the work of examination and treatment had been completed in all the inhabited territory on the eastern and southern coasts of the island. This embraced nine areas: Calliaqua, Belair, Zion Hill, Stubbs, Mesopotamia, Biabou, New Grounds, Colonarie, and Georgetown, where operations were conducted by the intensive method, and one—a sparsely-settled stretch of land between the Dry

* Report (No. 7,424) on Work for the Relief and Control of Hookworm Disease in St. Vincent, by Dr. P. B. GARDNER.

river and the northernmost point of the island—where the work was done by the dispensary method, and the people were invited to visit the office in Georgetown for examination and treatment. During the early months of 1918 the Medical Officer in Charge was on leave, but on May 11, 1918, work was reopened in the Lowman's district in the south-western part of the island. This district includes two large villages, Lowman's and Camden Park, and a large number of scattered homes. The work was completed in August 1918, and the campaign in St. Vincent was then indefinitely suspended.

Infection with other Parasites.—Of 21,430 persons examined up to December 1918, 91 per cent. harboured *Ascaris*, 73·4 per cent. *Trichocephalus*, and 10·6 per cent. *Strongyloides*. One person only was found with *Taenia* (sp. unidentified).

Latrine accommodation was found in only 20 of the 241 homes surveyed in the Lowman's district. During May and June a "re-infection survey" was made of persons cured in the earlier stages of the campaign. The original campaigns were completed in the Calliaqua district on September 30, 1915, in the Belair district on December 31, 1915, and in the Sion Hill district on April 5, 1916, all more than two years previously. Of 2,257 persons cured in these three districts, 1,525 or 67·6 per cent. were re-examined. Of these 60·5 per cent. were found to have become reinfected. The percentages ranged from 46·9 per cent. in the Belair area to 68·2 per cent. in the Sion Hill area. The degree of infection found in these areas at the time of the original surveys was: Calliaqua 31·5 per cent., Belair 68·5 per cent., Sion Hill 60·4 per cent. These figures are attributable to failure to use latrines where provided and inadequate provision for the disposal of excreta and maintenance of latrines. In view of these results it was deemed inadvisable to continue work in St. Vincent until such time as the Government could organize a sanitary force to deal effectively with the problem of soil pollution.

Census	1,121
Examined	1,117
Found infected	955
Given first treatment	(92·6%) 884
Cured	766
Percentage of infected cured	(80·2%)
Percentage of treated cured	(86·7%)
Removed from area	(3·4%) 32
Remaining in area uncured	(16·4%) 157
(a) Not located	(0·1%) 1
(b) Refused	(4·4%) 42
(c) Medical reasons	(5·5%) 53
(d) Under treatment	(6·4%) 61

Trinidad (1918).*

During 1918 intensive operations were completed in the San Juan, Santa Cruz, Maracas, Laventille and Caroni areas, and in the Boys' Reformatory at Diego Martin.

Treatment.—Thymol finely powdered and mixed with an equal quantity of sodium bicarbonate and given in gelatin capsules in two equal doses, one at 6 a.m. and one at 8 a.m. The total amount usually given to an adult in the first treatment is 40 gr. of thymol.

* Report (No. 7,426) on Work for the Relief and Control of Hookworm Disease in Trinidad, by Dr. G. C. PAYNE.

This is increased or diminished in subsequent treatments as indicated by the minor toxic symptoms shown by the patient. A purge of magnesium sulphate is given the evening before treatment, and a similar purge two hours after the second dose of thymol.

Oil of chenopodium in small doses is used in the treatment of small children in preference to thymol because it admits of a simpler technique of administration, and it is efficacious in expelling *Ascaris lumbricoides*. At 6 a.m. one minim for each year of apparent age is administered in a hard gelatin capsule with $\frac{1}{2}$ oz. of castor oil. If the child is unable to swallow the capsule the chenopodium is put in the castor oil and a little simple syrup is given afterwards. The taste of the castor oil is disguised by oil of peppermint. A further purgation is only given if the castor oil fails. To adults complaining of dysentery, active or latent, 15 minims of chenopodium were given, with 1 oz. of castor oil or corresponding dose of magnesium sulphate.

Of the 40,482 persons examined for hookworm in areas completed during the period from the beginning of the intensive work up to December 31, 1918, no less than 13,281, or 32·8 per cent., were found infected with *Ascaris*, 11,956, or 29·5 per cent., with *Trichocephalus*, and 2,705, or 6·7 per cent., with *Strongyloides*. In addition, 134 persons were found to harbour *Oxyuris* and 11 *Taenia* [species not stated]. The race incidence was as follows: East Indian, 87·1 per cent.; Black, 68·7 per cent.; Creole, 66·2 per cent.; White, 30·5 per cent.; Yellow, 61·8 per cent.; Red, 95·7 per cent.; unclassified, 69·6 per cent. The infection rate under six years was 45·5 per cent., while that of all ages over six years remained fairly constant between 75 and 80 per cent.

The type of latrine most generally used in the villages of Trinidad has a pit from 3 to 10 ft. deep and a very frail superstructure. This is not well suited to flat land where the ground water is close to the surface, but as yet no suitable substitute has been devised. Other types are too expensive in first cost and require too much attention to keep them in sanitary condition.

Census	13,672
Examined	13,474
Found infected	10,828
Given first treatment	10,106
Cured	7,846
Percentage of infected cured	(72·5%)
Percentage of treated cured	(77·6%)
Removed from area (or dead)	(5·4%) 589
Remaining in area uncured	(22·1%) 2,393
(a) Not located	(0·4%) 48
(b) Refused	(9·6%) 1,042
(c) Medical reasons	(5·0%) 544
(d) Under treatment	(7·0%) 759

*British Guiana (1918).**

Intensive operations were completed in five artificially defined areas of the Essequibo district and in the Onderneeming Industrial School—a Government institution. Some special experimental work was completed on the Anna Regina sugar plantation. The populated section of Essequibo is limited to a narrow strip along the public road.

* Report (No. 7,442) on Work for the Relief and Control of Hookworm Disease in British Guiana, by Dr. F. W. DERSHIMER.

The inhabitants are an agricultural people. The soil in the greater part of this district differs from that of the other sections of British Guiana where work has been conducted. Here it is of the sandy, moisture-holding type so favourable to the development of hookworm ova. It is noteworthy that the percentage of infection greatly exceeds that of the other districts in which the soil was almost entirely of clay.

A trial of the technique described by Capt. BARBER, U.S. Army, was made on specimens already pronounced as positive. In some cases the results were excellent, from 10 to 20 times as many eggs being found on one slide as were counted on an ordinary smear, but with others the results were very poor. It was concluded that the Barber method is not reliable.

Thymol was used with sodium bicarbonate as a diluent. The average dose was increased until healthy adults received 60 gr. and children proportionately. No ill effects resulted, but no appreciable increase in the percentage of cures was obtained.

Of the 11,719 persons examined for hookworm, 3,428, or 29·3 per cent., were found to be infected with *Ascaris*, 2,009, or 17·1 per cent., with *Trichocephalus*, and 536, or 4·6 per cent., with *Strongyloides*. These figures do not represent a complete index of infection as a thorough examination was made only for bookworm ova.

The percentage of hookworm infections of the various age groups in the Essequibo district is as follows:—

Under 6 years	..	..	..	29·2%	of	1,621	examined.
6-18 years	..	..	..	79·5%	"	3,360	"
19-40	"	..	..	84·4%	"	4,553	"
41-60	"	..	..	80·7%	"	1,776	"
Over 60	"	..	..	74·6%	"	409	"
All ages	..	..	..	74·5%	"	11,719	"

Sanitary Improvement.—Of the 3,245 homes inspected in the Essequibo district during the progress of the campaign, 48·3 per cent. had latrine accommodation at the time of the first inspection, and 59·2 per cent. of the houses were so provided at the last inspection. The pit latrine is the type which the Government officers require to be erected in the country.

It was noticed that 95·8 per cent. of the inmates of the Onderneeming Industrial School harboured hookworms. The pail system was in use at this Institution, and the contents were buried about 2 ft. deep in sandy ground around lime trees. Soil from the surface showed innumerable larvae, showing that probably pit latrines in such soil are not efficient. The Demerara Bauxite Co. continued to maintain and improve the sanitation of its settlements up the Demerara river according to the scheme adopted in 1917. The manager of this company states that the efficiency of his men has been increased from 25 to 50 per cent. from the sanitary and health work carried on in their behalf during 1917 and 1918.

Finance.—The cost per person treated, based on the 39,901 persons treated, was \$1·91, and the cost per person cured, based on 32,230 persons cured, was \$2·36.

Technique.—In order to test the efficiency of the centrifuge, specimens sufficient to give 1,000 positives were examined without using it and the number of slide on which the ova were found was noted. Centrifuged preparations of these specimens were then examined and note was again made of the number of the slide on which ova were

discovered. The percentage of positives found on first and second slides after centrifuging were practically the same as those found on the corresponding direct smear slides, with a slight advantage in favour of those not centrifuged. The percentage found on the third slide in the centrifuge technique was, however, slightly larger than on the corresponding slide in the plain smear technique, so that the results as a whole appear to have been approximately the same with both methods. This is attributed to the training of the microscopists employed. With average help the centrifuge technique is said to show from 12 to 23 per cent. more positive cases than the direct smear method alone.

Census (Essequibo District)	11,856
Examined	(98.8%) 11,719
Found infected	(74.5%) 8,727
Given first treatment	(93.7%) 8,175
Cured	6,871
Percentage of infected cured	(78.7%)
Percentage of treated cured	()
Removed from area (or dead)	(6.5%) 565
Remaining in area uncured	(14.8%) 1,291
(a) Not located	4
(b) Refused	(2.4%) 210
(c) Medical reasons	(6.2%) 543
(d) Under treatment	(6.1%) 534

*Brazil (1918).**

During the year 1918 the work of the Department of Uncinariasis was greatly extended. In the Federal District the intensive post in the town of Zumby completed its task on the Ilha do Governador in the Bay of Rio de Janeiro and was transferred to the District of Jacarepagua. In the state of Sao Paulo an intensive demonstration was completed in the municipio of Guarulhos, near the city of Sao Paulo. The post was then transferred to the municipio of Brodowski, in the coffee region, and a new intensive post was established in Atibaia. In the state of Rio de Janeiro a second intensive post was founded in the municipio of Campos, the centre of the sugar industry. In the state of Minas Geraes a survey was begun and a small post was established at the capital for the examination of school children. In addition a number of posts were maintained entirely by state funds, but an extraordinary number of national calamities affected the prosperity of Brazil during 1918, which interrupted and postponed the commencement of the work. The Laboratory of Hygiene of the Medical Faculty of the University of Sao Paulo co-operated by conducting malaria surveys in areas selected for intensive hookworm campaigns. Worm-counts were also made by the laboratory on 280 cases. These persons expelled a total of 29,029 worms, or an average of 103.6 worms per case. The average in the case of town dwellers of this group was well below 50, whereas agricultural labourers showed averages running from 55 to 233. In over 20,000 worms identified in the laboratory count, the ratio of *Necator* to *Ancylostoma* was 43 to 1. The comparative anthelmintic value of oil of chenopodium and thymol was also investigated by means of worm-counts. It was found that 46 per cent. of 138 cases were cured by two treatments of oil of

* Report (No. 7,469) on Work for the Relief and Control of Hookworm Diseases in Brazil, by Dr. L. W. HACKETT.

chenopodium administered 10 days apart (each treatment consisting of 1·5 mil of the drug given in three equal parts). The two doses expelled 97 per cent. of all the hookworms harboured and 98 per cent. of the Necator variety. Over 90 per cent. of the worms were expelled after the first dose. It is thus shown that the percentage of cures obtained with a given vermifuge is not an adequate criterion for determining the efficiency of the drug. On the basis of microscopic returns of persons cured, the efficiency of the routine treatment appears to be less than 50 per cent., but when accurately evaluated in terms of parasites expelled it is seen to be more than 97 per cent.

The inaccuracy of reports of infection and cure based on microscopic findings was revealed by worm-counts made on a number of cases reported negative or cured after thorough routine microscopical examination. On one farm in Sao Paulo 21 of the 71 inhabitants were reported negative upon microscopical examination of stools. All negatives were then treated with a single large dose of chenopodium and 191 worms were removed. Only six of the 21 were actually free of hookworms. Although the stool examinations were carefully done by three practised microscopists, over 70 per cent. of the negative cases were inaccurately diagnosed. When infection averaged less than 15 worms, microscopy failed to give a correct diagnosis in 52 per cent. of the cases examined, despite the fact that at least four slides were searched in each case, two before, and two after centrifuging.

	Ilha do Governador Federal District.		Município of Guarulhos, State of Sao Paulo.	
Census	—	7,062	—	4,088
Examined	—	6,636	—	3,854
Found infected	—	4,724	—	2,198
Given first treatment	—	3,922	—	1,972
Cured	—	2,736	—	1,371
Percentage of infected cured .. (57·9%)	—	—	(62·0%)	—
Percentage of treated cured	—	—	(69·5%)	—
Removed from area (or died) .. (6·4%)	302	—	(10·4%)	228
Remaining in area uncured (35·7%)	1,686	—	(27·3%)	599
(a) Not located	35	—	(1·0%)	21
(b) Refused	1,027	—	(12·4%)	273
(c) Medical reasons	222	—	(4·9%)	107
(d) Under treatment	402	—	(9·0%)	198

*Seychelles (1918).**

The work begun in the Mount Fleuri area was continued during 1918 and extended to north Mahe, when the completion of operations brought the campaign in the island of Mahe to a close. In the last month the work was begun in the island of Praslin, the next largest of the Seychelles group. This work is still in progress. The whole area of north Mahe, including a large part of the town of Victoria, is extensively shaded by coconut palms. The hookworm infection-rate was found to be lower than in central and southern Mahe, and this is attributed to the better sanitary accommodation. In the outlying portions of the area the inhabitants own or rent small plots of land on which they grow coconuts, bananas, maize, sweet potatoes and manico. The campaign during 1918 was conducted mainly on the intensive plan.

* Report (No. 7,444) on Work for the Relief and Control of Hookworm Disease in Seychelles, by Dr. J. F. KENDRICK.

Anthelmintics used were thymol and chenopodium. When thymol was used it was finely powdered, mixed with equal parts of milk-sugar, and administered in gelatin capsules in two equal doses. The maximum adult dose for robust men was 60 gr., the maximum dose for women 40 gr. Magnesium sulphate was given as a purge on the evening before treatment, and again two hours after the second dose of thymol. The chenopodium was administered in freshly-prepared gelatin capsules, except when given to children, when it was dropped on sugar. The maximum dose for men was 30 minims, for women 24 minims, and this was divided into equal portions administered with an interval of two hours. Magnesium sulphate was used before and after treatment as in the administration of thymol. A variation of the routine was employed in a part of north Mahe. The full daily dose of the chenopodium was placed in castor oil and given at 6 a.m. No purge was given before this treatment. Examinations were made seven and 14 days later. The second re-examination revealed the fact that no less than 5 per cent. of those reported cured on the first re-examination still harboured the parasite. These "false cures" were not experienced among the patients treated by the usual method.

Other Parasites.—Of the 18,058 persons examined in all areas from the commencement of the work in 1917 to the end of 1918, 70·3 per cent. were found to harbour *Ascaris*, 94·3 per cent. *Trichocephalus*, and 2·7 per cent. *Strongyloides*. Three persons were seen to have *Oxyuris*.

Racial Incidence.—Of the 18,058 persons examined, 15,575, or 86·27 per cent., were blacks, and 92·27 per cent. of these had infection; 2,483 were whites, and 83 per cent. were infected. The age incidence showed a constant rate of all persons over six years of age.

Sanitation.—The law provides for the construction of pit latrines in the country, and pail latrines in the town of Victoria. Practically every home throughout the island of Mahe has its pit latrine, but in the town the pail latrine has been found to be too expensive for each family to maintain, and the use and cost of maintenance is often shared by two or three families. The excrement in Victoria is collected at night and hauled in carts to coconut estates, where it is deposited in freshly prepared trenches and covered with 3 or 4 ft. of earth.

*Queensland (1918).**

The hookworm campaign in Queensland was inaugurated in April, 1918, and was carried out, under the direction of Dr. J. H. WAITE, in an area of 260 miles of coastal country reaching from Cooktown to Townsville and embracing a population of 14,137 persons. Within this area are six settlements, each accessible only by sea. In none of the districts worked by the intensive plan were operations completed by the end of the year [and the statistics are therefore withheld in this summary].

Queensland has an area of 670,500 square miles, and 53 per cent. of its territory lies within the tropics. The great dividing range five to 100 miles inland from the Pacific coast and parallel to it divides the state into a wet, narrow coast belt and a dry expansive interior.

* Report (No. 7,455) on Work for the Relief and Control of Hookworm Disease in Queensland, by Dr. J. H. WAITE.

The population, essentially of British stock with a small intermingling of Italians, Slavs, Chinese and Australian aborigines, has an average density of one person to the square mile, although the bulk of the people are found in the coastal districts. The rapidly disappearing aborigines now number about 16,000, of whom 5,000 are serving the white settlers. The chief industries are sugar in the coastal belt, metal and coal mining in the hill country, and farming in the interior. 11,678 persons were examined during 1918 and 22·5 per cent. were found to harbour hookworm. The sugar-growing spheres of Johnstone, Cairns, and Hinchinbrook show infection rates of 24·7 per cent., 25·2 per cent., and 32·1 per cent. respectively. There is no scavenging service, and the sanitary conveniences are wretched. In the townships of Cooktown and Cairns only 10·8 per cent. and 17·7 per cent. of the populations are infected, as a consequence of safer latrines and scavenger services.

Other parasites, incidentally reported, found in the routine examinations of 14,577 persons for hookworm were few. *Ascaris* was seen only 18 times, *Trichocephalus* on 183 occasions, and *Oxyuris* on 75, *Strongyloides* in 19 and *Hymenolepis nana* in 51 persons. These figures, it is stated, do not present an accurate index of relative infection.

Infection varies greatly with race. British stock shows 18·9 per cent., Italians 43·9 per cent., Chinese 5·5 per cent., and aborigines 75·9 per cent. The Italians and aborigines not only show utter carelessness in sanitary matters, but have also the habit of going without shoes. Like negro races in other parts of the world, the aborigines seem to possess a relative immunity toward the ill effects of hookworm infection and are of importance chiefly as distributors of disease. The infection rate for persons between six and 18 years old was 40 per cent., and probably results from the barefoot habit among the children in Queensland. In the Townsville school-children the infection rate was very light, viz., 7·5 per cent.

Sanitation.—The Queensland Health Act stipulates that pail latrines are to be used throughout the State and forbids the erection of pit latrines. The initial sanitary inspection throughout the districts mentioned above showed that of the 3,023 homes inspected, only 2·7 per cent. were without latrine accommodation of any kind, but that 93·5 per cent. had latrines of an insanitary type. In Cooktown and Cairns townships 82 per cent. were found to be sanitary on the last inspection, and there was marked progress in other districts. In some areas local authorities had hired a corps of carpenters, who were systematically remodelling all latrines.

Mental retardation averaging 5·4 months by Binet test and two months by Porteus was found to occur in lightly infected children, while averages of 19·5 months by Binet test and 13·3 months by Porteus was determined in heavily infected children.

R. T. L.

[The various Reports referred to in the footnotes are issued by the Rockefeller Foundation International Health Board, as lithographed Reports for limited distribution.—Ed.] . 4,

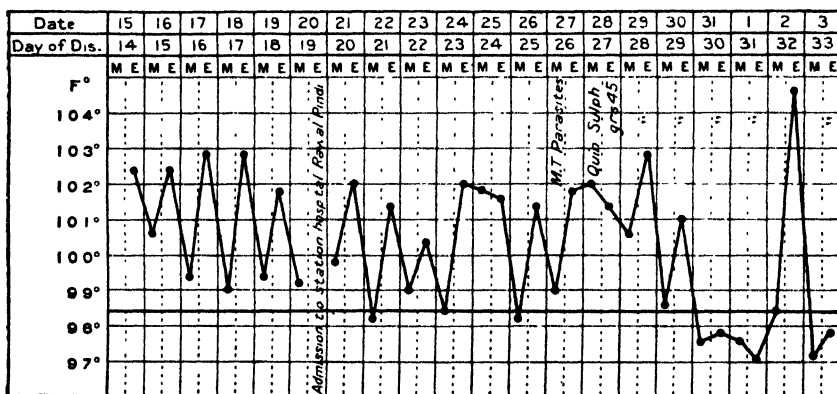
ENTERIC FEVERS IN THE TROPICS.

LARGE (D. T. M.). **Some Laboratory Work in Connexion with the Afghan War, 1919.**—*Jl. Roy. Army Med. Corps.* 1920. Nov. Vol. 35. No. 5. pp. 386–395. With 2 charts in text.

The section containing work done in investigating cases of "Enterica" extends from p. 389 to p. 392. Captain Large describes culture methods on Conradi's medium. Colonies showing no agglutination when placed on a slide were discarded. Difficulty was experienced in the hot weather with litmus; it deteriorated rapidly no matter from what source obtained, so much so that "in order to obtain a reliable result in the sugar tests, the addition of litmus to the sugar was given up altogether." Organisms were inoculated into "white" sugars and the litmus added after two or three days' incubation.

Two hundred and sixty-one Widal tests were done, each against *B. typhosus*, *paratyphosus* A and *paratyphosus* B. The important feature in Captain Large's work is that it shows the limitations of this test in the vaccinated individual. He gives the following example:

Sergt.-Major W., transferred from the frontier as a case of the enteric group, was admitted to hospital in Rawalpindi about the 19th day of disease, and his blood was sent for Widal test. *B. typhosus* was agglutinated 1 : 250, and, clinically, he seemed a case of typhoid fever. During a differential count of his blood, parasites of malignant tertian malaria were found; his temperature shows characteristic malaria.



Case of Subtertian Malaria in Enteric Inoculated Soldier.
(Reproduced by permission from the *Journal of the Royal Army Medical Corps.*)

Single agglutination tests are, therefore, of no value in those who have been inoculated, and in such cases a series of tests should be made at four-day intervals. Even the fact that agglutination occurs in tests so made, during a suspected attack of enteric fever, is not conclusive proof, unless there is a marked variation in the titre obtained. Thus, in an example quoted, rising agglutination to *B. typhosus* might be found;

but when the series of tests was carried on into convalescence, several cases showed a much more marked rise to *B. paratyphosus* A, pointing to that organism as the true cause of the fever (especially in India).

The following cases which occurred in this laboratory are instances in which the test was of value as an aid to the diagnosis of enteric group—

		First Widal			Second Widal			Third Widal			Fourth Widal		
		T	A	B	T	A	B	T	A	B	T	A	B
Pte. D.	..	125	250	—	250	250	—	500	250	—	800	250	—
Pte. F.	..	125	25	—	500	25	—	800	25	—	—	—	—
Sergt. H.	..	500	—	—	800	—	—	1,000	—	—	—	—	—
Pte. S.	..	100	—	—	250	—	—	500	—	—	—	—	—
Miss G.	..	125	125	—	250	250	—	125	500	—	—	—	—
Gnr. F.	..	125	50	—	50	125	—	25	500	—	25	2,000	—

while the next table gives cases in which the results were of no value for diagnosis of fresh enterica infection.

	First Widal			Second Widal			Third Widal			Fourth Widal			Diagnosis.
	T	A	B	T	A	B	T	A	B	T	A	B	
S. M. W.	250	—	—	125	—	—	—	—	—	—	—	—	Malaria. Typhoid Fever, <i>B. typhosus</i> found in blood.
Pte. U. . .	—	—	—	—	—	—	—	—	—	—	—	—	
Capt. R.	—	—	—	25	50	—	—	—	—	—	—	—	Enteric Group, clinically.
Gnr. G.	—	—	—	—	—	—	50	—	—	—	—	—	" " "
Sergt. R.	—	—	—	—	—	—	—	—	—	—	—	—	" " "
Lieut. G.	—	125	—	—	—	—	—	—	—	—	—	—	Malaria.

J. H. Tull Walsh.

LEDINGHAM (J. C. G.). **The Cultural Diagnosis of Enterica in Inoculated Individuals.**—*Lancet*. 1921. Jan. 8. pp. 72-74.

* The author refers to a view widely entertained in certain circles as the result of war experience especially in France, that protective inoculation renders diagnosis by blood culture impracticable and futile, the bacteriaemic phase, in infected persons previously inoculated, being presumably either non-existent or too transient to permit of successful attempts at blood culture. He adduces evidence from experience of American bacteriologists in France and from personal experience in the Mesopotamian zone that cases of enterica in inoculated individuals lend themselves as readily to blood culture as cases occurring in uninoculated individuals. The author also questions the validity of

* This paper was noticed in No. 5 of Vol. 17. What appeared to be a summary of its contents was in reality an expression of the views of the Sectional Editor, and the author himself has furnished the summary now printed.—Ed.

compiling enterica returns based largely on agglutination methods of diagnosis and of drawing hasty inferences with regard to the symptomatology of enterica as manifested in inoculated cases so diagnosed.

J. C. G. Ledingham.

In reference to the paper summarized in Vol. 17, No. 5, p. 408 of this *Bulletin* [BOURGÈS: Deux cas de septicémie éberthienne à type de fièvre intermittente.] Lt.-Col. W. P. MACARTHUR, R.A.M.C., writes as follows to the Sectional Editor :—

" I was interested to see your remarks in this month's *Tropical Bulletin* on the two cases of enteric fever of an intermittent type, and note that you consider there may have been an error in diagnosis. It might interest you to know that I had two similar cases while Special Sanitary Officer, Mauritius, 1911-14. The first was a civilian whom I saw in consultation with Dr. de Chazal, a well-known practitioner. This patient was governess to a family living in Vacoas, and had been in Mauritius only a couple of months or so when her illness commenced. From the temperature, Dr. de Chazal thought the infection might be malaria, though he was puzzled as to where the patient could have been infected, for Vacoas is malaria-free and the lady had not been away from that district (except during daylight) since her arrival. He examined her blood several times and found no parasites. I was asked to see the case, and made a blood culture, and, further, films. The latter showed no parasites, and *B. typhosus* grew out from the cultures. Amongst other tests, my routine then was to put such organisms through Lactose, Glucose, Saccharose, Maltose, Dulcitol, Sorbitol and Salicin. There was no doubt whatever as to the nature of the organism.

" The second case was a soldier running the same type of temperature. I used to do a blood culture and make films as a routine in every febrile case admitted to hospital, and in this case *B. typhosus* was isolated. No parasites were found, and, indeed, this man was from a malaria-free station.

" No Widal reaction was done in either case as both patients were treated with an autogenous vaccine which would vitiate any readings made, and, moreover, so far as the diagnosis was concerned, a Widal test was not required. Neither patient had been inoculated.

" I am sorry I cannot send you copies of their charts at present. Dr. de Chazal reported the lady's case to a meeting of the local Medical Society, and I gave him notes of the military case, which he also brought before the meeting. The charts and notes were published in the local Society's Medical Journal, and, no doubt, could be obtained if you would care to see them. The charts looked very like those in the *Bulletin*, but I don't remember either of the patients having shivers, as reported for the French cases."

W. P. MacArthur,

(Brev. Lt.-Col., R.A.M.C.).

MISCELLANEOUS.

BRUMPT. **Rapport au sujet d'une proposition du Dr. Jaworski, concernant la nomenclature zoologique, au nom de la Commission de la terminologie médicale, composée de MM. Chauffard, Clay, Roger et Brumpt, rapporteur.**—*Bull. Acad. Méd.* 1921. Mar. 1. Vol. 85. No. 9. pp. 254-257.

This is a criticism of certain proposals made to the Academy of Medicine of Paris by the "Commission internationale chargée de la revision des nomenclatures nosologiques" with the design of establishing some standard of uniformity of nomenclature for diseases due to infestation by parasites.

The proposals are: "(1) that the termination *osis* should be used for the designation of all diseases caused by a schizomycetes or a fungus, where the causal agent is known and is constant, *e.g.* tuberculosis, melitococcosis, typhosis, spirochaetosis, mycosis; and (2) that for all diseases provoked by an animal parasite the termination *iasis* should be employed, *e.g.*, trichiniasis, elephantiasis, phthiriasis, acariasis."

The critics, while allowing that these proposals have a plausible appearance of clarity, advance the following objections to them: (1) That pathogenic agents do not always correspond exactly with a morbid entity, since many different kinds of intestinal parasites give rise to similar clinical symptoms, and some parasites, such as the bacillus of tubercle and the spirochaete of syphilis, have divers pathological manifestations. (2) That names in the animal and vegetable kingdoms are, unfortunately, very far from immutable; they are subject to frequent correction, and to limitations and extensions of application, to the confusion of naturalists themselves, so that it would be too much to expect medical men to appreciate and follow these constant changes. (3) That generic names like "spirochaetosis" are capable of application to many different diseases; and that the exact position of the spirochaetes themselves in the scheme of classification is still in dispute. (4) That under the proposed terms elephantiasis might be interpreted as a pathological condition provoked by the elephant, etc.

The critics, while admitting that academic rules of nomenclature are not at all likely to meet with universal acceptance, and sympathizing with the view that a too rigid regard for the jots and tittles of such rules is an obstruction and a delusion, seem to express some approval of a method of nomenclature tentatively advanced by BLANCHARD and some of his associates, where, in order to express a pathological condition, the termination *iasis* would be employed for Greek *feminine* substantives and the termination *osis* for all others.

[This alternative nomenclature is open in an equal degree to the same objections that the authors themselves have advanced against the nomenclature proposed. "Elephantosis" would carry the same liability to grotesque misinterpretation as "Elephantiasis"; and "Spirochaetosis" must always stand for a general concept including numerous specific differentiae, even if—being compounded of two Greek feminines—it be changed to "Spirochaetiasis."

To the reviewer the proposals of the "Commission Internationale," if employed with common sense and with due regard to well-established claims and traditions, seem worthy of respectful consideration.

The Greeks themselves seem consistently to have used the termination *ιασις* for substantives denoting a morbid state having an association real or fancied with an animal. Thus, according to LIDDELL and SCOTT, *φθειρίασις* (*φθειρ*, a louse; *φθειριώω*, to be lousy) was used by ARISTOTLE to signify the morbid condition of lousiness; *ἐλεφαντίασις* (*ἐλέφας*, an elephant, and *ἐλεφαντίαω*, to have a skin like an elephant) was used by PLUTARCH to denote a morbid state of the skin resembling an elephant's hide in appearance; and *ψωρίασις* (*ψώρα*, itch or scab, and *ψωριώω*, to be itchy or scabby) was a word in general use for a morbid condition of itchiness or scabbiness. All these substantives, it will be noticed, are derived from their respective verbs by adding the termination *σις* (which denotes action in progress, or the result of action) to the inflectional stem—a recognised rule of etymology, not a matter of fancy.

To follow the Greek precedent of naming morbid conditions of animal association as if derived from verbs ending in *ω* therefore seems reasonable, and if any contrast be necessary the names of morbid conditions of bacterial and fungal association might be formed on the assumption that they are derived from verbs in *ω*.]

A. Alcock.

CORNWALL (J. W.). **Address to the Medical Research Section of the Indian Science Congress. The Organisation of Medical Research in India.**—*Indian Jl. Med. Res.* (Special Indian Science Congress Number. 1920. pp. 1-7.)

The author very rightly advocates the need of organisation in medical research: organisation of forces and appliances is indeed necessary for all successful enterprise. But in his scheme the author includes not only the appliances and machinery of research—laboratories, libraries, museums, catalogues of scientific literature, training schools, etc.—which it is not difficult to organize if the money be forthcoming but also the objects of the quest, which depend so much upon individual aptitude and individual enthusiasm, things of the spirit not quite so easy to organise. "Give me the spirit; what care I for the thews and bulk!" says Sir John Falstaff, who perhaps under-estimated the value of organised appliances for work.

The author is in favour of a State Department of Medical Research worked by a Director, subordinate to nobody, and a Council of six Heads of Laboratories, who would not only control all the means and machinery of research, but also decide annually the problems to be investigated. The author allows that individual inspirations must be allowed for and encouraged, but that is where the obstructions of a State Director subordinate to nobody begin. For history tells us that the inspirations of JENNER and PASTEUR and LISTER did not at their outset receive very much countenance from the directors of medical opinion of their time.

Again, on the not very pertinent ground that a man educated for the law does not in middle life become an architect, the author, while allowing that a medical man is none the worse for a working knowledge of all branches of science, does not approve of his going too far in any particular direction. He may make excursions into other provinces, but not long visits. Here, again, are puzzles for an omnipotent Director—to decide how far and how long an individual with inspirations of his own must be allowed and encouraged to go. We can hardly suppose

that by regulations of this kind a Pasteur, after achieving distinction as a chemist, would be permitted to make a lifelong voyage of exploration into undiscovered realms of microbiology, or that a Metchnikoff, having established himself as a zoologist, would be encouraged to investigate the arcana of pathology.

A. A.

BALFOUR (Andrew). **The Future of Research in Tropical Medicine: Facilities in Mauritius.** [Correspondence.]—*Brit. Med. J.* 1921. June 4. pp. 834-835.

Mauritius is recommended as a field for research. It is a quiet, peaceful place, and offers a variety of problems for investigation. The incidence of filariasis and the local insect carriers, the local molluscan host of *Schistosoma haematobium*, the insect locally responsible for spreading surra, the enemy of malaria and the anopheles hosts of the malaria parasite, the intestinal helminthic diseases—these are a few of the subjects that would repay attention. There is an excellent little laboratory eight miles from Port Louis, and the local representatives of the profession are keen.

A. A.

SEN (D. N.). [With Note by Major GOURLAY]. **Auto-Haemic or Auto-Serum Therapy.**—*Indian Med. Gaz.* 1921. Mar. Vol. 56, No. 3. pp. 94-96.

What is here described as "auto-haemic" therapy consists in injecting into a patient, either into a vein or under his skin, some of his own blood. Six cases, including one of severe brachial neuritis, going on to paralysis and considerable atrophy of the arm, with a previous history of gonorrhoea and syphilis; two of acute gonorrhoea; one of disabling pain in the sacro-iliac joints, also with a previous history of gonorrhoea; one of extensive eczema accompanied with pain in the legs; and one of asthma—are here set forth and are described as either cured or benefited by this treatment.

A small amount of blood is drawn from the patient, is mixed with sterile, distilled water, and is then "subjected to certain laboratory processes, by which a solution containing the products derived from the splitting up of the highly specialized constituents of the blood is obtained." The treatment appears to consist in a course of five or more injections of this solution of blood, beginning with a dose of 1 cc. and increasing it to 5 cc., the course extending over about three weeks.

The author likens this treatment to auto-vaccination, and he gives a list of references to the literature of the subject. [He has not, however, included METCHNIKOFF's work on Immunity in his list; which is a pity, as the sixth chapter of that work throws a good deal of light on the phenomena in question and to a considerable extent justifies experimentation in therapy of the kind here described.]

A. A.

CAMAIL & CAZANOVE. **Considérations sur la valeur physique des contingents indigènes recrutés à Madagascar pendant la durée de la guerre.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1920. Dec. Vol. 18. pp. 8-46.

The greater part of this long paper consists of local statistics of recruitment, very valuable for the local archives, but not in this form

furnishing any general lessons for the world. A few pages deal with the sanitary condition of the recruits pending their embarkation. Besides the common diseases of the country—malaria and pneumonia—certain diseases seemed to be promoted or engendered by concentration or other circumstances of recruitment. At some centres there occurred epidemics of cerebro-spinal meningitis. Concentration also provided optimum conditions for venereal diseases and itch. Intractable sores and ulcers of the legs, often initiated by chigoes, furnish some terrible statistics; in the months June-September 1917, at Tamatave, from 13 to 24 per cent. of the mean strength was rendered ineffective by such sores and ulcers.

A. A.

LASNET. **État sanitaire des troupes noires de l'armée du Rhin (troupes sénégalaises) pendant l'hiver 1919-20.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1920. Dec. Vol. 18. pp. 1-8.

An analytical estimate, from the sanitarian standpoint, of the capabilities of Senegal troops for service in a cold climate. The troops under observation formed a brigade of 5,637 men stationed at and about Mayence during the winter of 1919-20. They were lodged in good masonry barracks, were supplied with woollen underclothing and gloves, trench boots, and warm overcoats, and were well fed, receiving more meat and sugar and much more fat, but less bread, than Europeans, and no wine. The prevalent diseases were bronchitis and other affections of the respiratory system, more particularly in February than in the months of dry cold, and tuberculosis. The tuberculosis was of the reactionary lymphatic glandular type, as exhibited in children. Venereal disease was common enough, chiefly "blennorrhagia." On the whole morbidity was less than among European troops; but specific mortality was greater, in consequence, mainly, of the more acute course of pulmonary cases. The men were cheerful, "bon enfants" and fond of outdoor games. They were not averse to the pleasures of a social evening, but beneath a childish gaiety it would seem as if there always lay the wide landscape of the lordly Niger and the huts beneath the palm-trees.

A. A.

ORTICONI (A.). **La lutte épidémique chez les réfugiés russes de Crimée à Constantinople en décembre 1920.**—*Bull. Soc. Path. Exot.* 1921. Mar. 9. Vol. 14. No. 3. pp. 187-194.

The author endeavours to articulate the appalling horrors that followed Wrangel's flight from the Crimea before the Bolsheviks. Shiploads of refugees, about 150,000 miserable souls, including not only the army and its sick and wounded, but also fleeing multitudes of civilians, arrived at Constantinople packed like cattle, sick and whole all together, and swarming with vermin. The author hints at the after-consequences in spreading disease among mankind. As a matter of fact, a few days after their arrival cases of typhus, relapsing fever, smallpox, cholera, plague and typhoid broke out among the refugees, those of relapsing fever almost amounting to an epidemic.

A. A.

BERKELEY-HILL (Owen). **A Wassermann Survey of the Inmates of the Ranchi European Lunatic Asylum.**—*Indian Med. Gaz.* 1921. Mar. Vol. 56. No. 3. pp. 89-94.

The entire population of the Ranchi European Lunatic Asylum, which is fairly representative of the middle or lower-middle European and Eurasian elements of the population of Northern, Central, and Eastern India, has been examined, 186 individuals in all, by the Wassermann test : 73, or 39·24 per cent., reacted positively. This is a startling figure compared with that obtained by HAMMOND (*Amer. Jl. of Insanity*. 1913. July) in the New Jersey State Hospital, which was 2·7 per cent.

The author thinks the difference may be due to the facts that in the Ranchi statistics the number of examinations is few, that the cases had not received antisypilitic treatment since admission, that they all came from an urban population, and that the community from which they came is very heavily infected with syphilis, as may be inferred from the huge percentage of unmarried women who are found to be sufferers.

The author tabulates his data, and considers that they support HAMMOND's argument that syphilis among the insane is not more frequent or more different in its incidence than among the general community.

A. A.

CORRÊA DA COSTA (Clovis). **Nosologia regional de Pernambuco.**—*Arch. Brasileiros de Med.* 1920. June. Vol. 10. No. 6. pp. 275-338. With 1 text fig. and 13 charts.

An account of an official visit to the district of Mocambo, State of Pernambuco, Brazil, to determine the nature of an epidemic prevailing there in the summer and autumn of 1919. It was found that two epidemics were raging and had caused heavy mortality, one characterized by high fever, bilious and subsequently "black" vomit, anuria and multiple haemorrhages, and a coincident prevalence of stegomyia mosquitoes, the other by buboes and a coincident epizootic causing enormous mortality among rats. An intensive anti-stegomyia campaign was entered upon, with good results, General Lyster, of the Rockefeller Foundation, assisting with advice and co-operation. As regards plague, locally known as "peste do caroço" (literally "nut" or "kernel plague"), the author states that the disease "has been endemic over an enormous area of the interior of the State for the past six years, and it appears likely that there will be formed there, if not already formed, a focus of plague such as we have in British India."

F. S. Arnold.

SWAN (John M.). **Medical Notes on the Dominican Republic and Haiti.**—*Amer. Jl. Trop. Med.* 1921. Jan. Vol. 1. No. 1. pp. 19-27.

A demographic sketch of the island of Santo Domingo, two-thirds of which, as the Dominican Republic, has been administered under the direction of the government of the United States since 1916. The prevailing diseases are shown in a table. Another shows the hospitals available and their equipment.

A. G. B.

VALLET. Rapport sur le fonctionnement du service médical du Consulat de France à Tchong-King pendant l'année 1919.—*Ann. de Méd. et de Pharm. Colon.* Paris. 1920. Dec. Vol. 18. pp. 105-109.

The commonest maladies at Tchong-King are syphilis and tuberculosis, "which decimate the population." Ulcers, cancers, cirrhosis of the liver with ascites, eye diseases, and skin diseases were also common. Two cases of phagedenic chancre were seen which had entirely destroyed the penis.

The author describes the housing of the population, and states that the mendicant fraternity, to the number of about a thousand, live in deep caves, opening in almost vertical cliffs. Here one meets with misery unmitigable and unutterable: in one wretched being the eyeballs, ears and lips had gone.

The number of cases treated in the hospital in 1919 was 1,424.

A. A.

THOMSON (J. Oscar). Advanced Pathological Conditions observed in South China.—*New York Med. Jl.* 1921. Apr. 6. Vol. 113. No. 11. pp. 530-534. With 4 text figs.

Seventy-five per cent. of the patients admitted to the Canton Hospital present advanced pathological conditions and are usually brought there by severe pain. Some of the more extreme are here described and figured. Tropical diseases do not make any large contribution.

A. G. B.

ELLIS (Aller G.). An Analysis of One Hundred Postmortem Examinations in Siam.—*Jl. Lab. & Clin. Med.* 1921. Jan. Vol. 6. No. 4. pp. 199-212.

The post-mortem examinations were made in Bangkok in 1919-1920: these, and others in the same period, covered 45 per cent. of the deaths. Most of the subjects were Siamese, but some Chinese are included. The primary or chief causes of death, as determined from the lesions and the clinical course of the disease, were as follows [conditions occurring less than three times not listed]:—

Abscess of pelvis	3	Endometritis, puerperal	3
Bronchopneumonia	5	Fatty degeneration of heart ..	3
Cholera	3	Myocarditis (chronic)	3
Cirrhosis of liver, atrophic ..	5	Tuberculosis (lungs)	10
Dysentery, amebic	17	Typhoid fever	3
Dysentery, type doubtful	3		

The author notes that more than a quarter were due to diseases of the intestines—dysentery, cholera, typhoid, and one case of ankylostomiasis.

A summary of the lesions found is given under the respective organs. Vesicular emphysema of the lungs was noted no less than 43 times. Minor degrees of this condition are almost constant in adults in Bangkok. Gross syphilitic lesions were rare. There were only 7 cases of pigmentation of the spleen, and 4 of the liver; this surprises the author, but he states that malaria is not so frequent in Bangkok as further north. There were 11 cases of tuberculosis—10 of the lungs and one of the hip. The tuberculosis process "does not appear so widespread, so active, so broadly destructive as in the average case in the United States . . . around the cavities may be found small tubercles, but

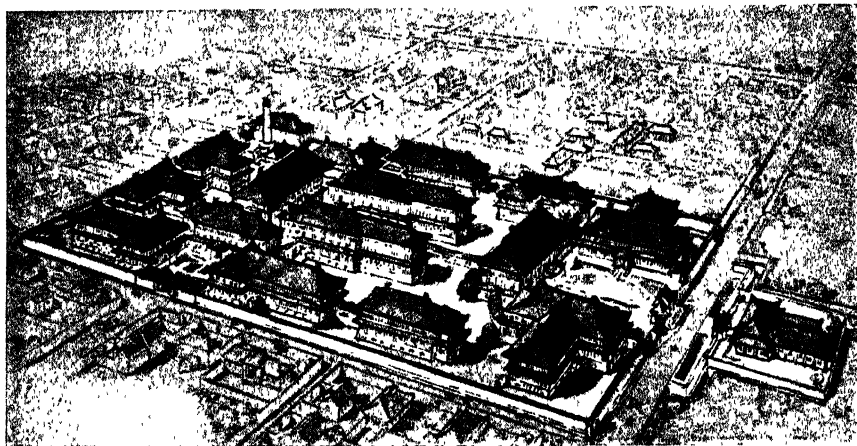
rarely any extensive areas of necrosis . . . the general appearance is that the tissue had been putting up a good resistance." In 11 other bodies there was healed tuberculosis in one or both lungs. It is noted that Bangkok is only 4 feet above sea-level, and probably not favourable for the tuberculous. There were 9 cases of tumour, 7 malignant and 2 benign. Intestinal parasites were 4—hookworm and tapeworm, one of each, ascaris 2. Of the amoebic dysentery cases three had lesions in the ileum ; in three also there was liver abscess.

A. G. B.

REVIEWS.

PEKING. Peking Union Medical College. Annual Announcement 1921-1922. 86 pp. With 6 figs. and 1 folding plan. Peking, China

That it is easier to make money than to keep it, and that it is easier to make money than to spend it wisely, are trite sayings: that it is easier to make money than to give it away without a great backwash of harm, would, no doubt, be equally trite if the giving away of life's winnings were a common practice among ordinary men. Sometimes, however, the Croesus



Peking Union Medical College. Perspective view, looking North East, of the new buildings (erected or proposed), on a site of approximately nine acres, for the medical school and hospital. The remaining buildings of the College, including the Pre-Medical School, dormitories and residences, are on other property near by.



Some of the College buildings as completed.

ideal and the Solon ideal, as these ideals are represented to us by Herodotus, are found united, and then we see money freely given for a purpose where even the bias and indirections of the cynic can hardly forecast anything but blessing to him that gives and him that takes.

These reflections must strike anyone who reads the "Announcement" of the Peking Union Medical College for the current year, a strictly business-like statement of a grandly designed and well-furnished enterprise from which imagination may indeed body forth the form of things unknown.

The college was founded in 1906 by the co-operation of several big American and British missionary societies, by whom it was maintained until 1915, when it was taken over and reorganized on a magnificent scale by the China Medical Board of the Rockefeller Foundation. The reconstituted college, all the buildings of which are of the most modern type, comprises a Hospital and all its appurtenances, a Medical School, a Pre-Medical School, a Training School for Nurses, and all the material requirements for religious instruction and social life and training.

The Medical School includes separate and distinct departments of anatomy (with embryology in association), physiology, pharmacology and physiological chemistry, pathology (with bacteriology and parasitology in association), medicine (with neurology and psychiatry in association), surgery (with röntgenology in association), obstetrics and gynaecology, ophthalmology, and otology, rhinology, and laryngology. Each department is administered by a professor, under whom is an assistant professor, and an associate professor where necessary, and associates and assistants. The language of instruction is English, and admission is contingent either on preliminary graduation in the Pre-Medical School, or on passing an entrance examination after furnishing evidence of previous graduation in some approved institution. The Medical School was opened for work in 1919, but will be formally opened with the entire Institution in September of the present year. The course of instruction, including one year of special work in the laboratories or hospital, occupies five years; students of both sexes are admitted; and the total individual expenses for a school year, inclusive of accommodation, board, books and incidentals, amounts to something between 200 and 250 dollars of Peking silver currency.

The Pre-Medical School, which was opened for work in 1917, is a fine modern building situated near the Medical School. It contains separate departments of biology (mainly animal biology), chemistry, and physics. Each department is administered by a head who has the status of assistant professor, and is staffed with an instructor and one or two assistants. This school also includes a department of Chinese, and a department of Modern European Languages (English, French, and German), for the ample design of the founders not only comprehends accessible portals to Western thought and science, but also foresees a time when medical education will extend to the vernacular plane. Admission is by examination in English, mathematics, and Chinese composition. The course of study occupies three years.

Both in the Medical School and the Pre-Medical School there are scholarships and studentships for responsible service.

The Training School for Nurses was opened in 1920. The course, which extends to four years, including one year in the Pre-Medical School (or its equivalent of work), is a most comprehensive one, embracing nursing, house-keeping, hygiene, cookery, dietetics, massage, etc., and also anatomy and physiology, pathology and bacteriology, physics and chemistry, materia medica, surgery, medicine, obstetrics and gynaecology, ophthalmology, and even clinical microscopy; also, during the first three years, instruction in English and Chinese.

The government of this beneficent institution is vested in a board of 13 trustees, six of whom are appointed severally by the six missionary societies that initiated the college; and seven by the China Medical Board of the Rockefeller Foundation.

KEANE (G. J.) [D.S.O., M.D., Ch.B., D.P.H., D.T.M., R.A.M.C.] & TOMBLINGS (D. G.). **The African Native Medical Corps in the East African Campaign.** With a Foreword by Sir Robert T. CORYNDON, K.C.M.G., Governor of the Uganda Protectorate.—63 pp. With 5 plates. London: Richard Clay and Sons, Ltd., Brunswick Street, Stamford Street, S.E.1.

The African Native Medical Corps, raised for service in the East African Campaigns of the Great War, was recruited to begin with from the youths educated in the Mission Schools of Uganda, its strength being at first 40 men. Some misgiving might have been felt at the initiation of the experiment, for the native of Uganda, though highly intelligent, seems to be something of a Hotspur in temperament—infinately proud, and resentful of indignity, but faithful and self-sacrificing if treated with consideration. Ultimately the corps reached a strength of ten British Officers, and 1,500 men representing nearly all the tribes of British and "German" East Africa. The wonderful success of the experiment is best described in the words of Major H. B. Owen, D.S.O., to whom the Commanding Officer, Major G. J. Keane, D.S.O., gives unstinted credit for his organising ability :

"At first, lack of African N.C.O.'s necessary for the maintenance of discipline, and to assist the British *personnel* in training recruits, was a great handicap. Suitable men, however, were rapidly trained and a permanent depot staff formed. It was realised that beyond imparting technical knowledge it was highly important to teach discipline and conduct. Many fail to appreciate how little the average African knows of obedience. Discipline in the home hardly exists with them, often it is the custom for children to be brought up by indulgent relatives. Recruits were ignorant of the meaning of simple obedience as the English schoolboy understands it, and certainly had no idea of the meaning of Army discipline. Hence, 'Barrack square' training was made a primary feature of the depot course of instruction, in order that habits of obedience, punctuality, promptness and smartness might be inculcated. With the object of eradicating the idea that manual work is degrading, often the belief of the educated African, one hour's fatigue was included in the daily routine. The importance of physical training was recognised, the first parade of the day being devoted to this. Not only did rapid improvement in bearing and physique result, but alertness both of mind and body was developed. The technical side of the training consisted of lectures and demonstrations in first-aid, nursing duties, and camp sanitation. A special point was made of teaching correct conduct towards Europeans and a sympathetic attitude towards patients. Africans are not naturally sympathetic towards the sick. Sometimes, indeed, the ill and weak are actually neglected. Sympathy had therefore to be taught; insistence on the fact that it is a virtue developed in civilised peoples appealed to the African, who considers himself on the road to civilisation. As time went on, not only were no untrained men drafted out of the depot, but men were sent to units to replace those who had not been through the depot course, these latter returning to the depot for instruction.

"There is no doubt that the lad who enlisted in this corps not only rendered useful service to the country, but also himself greatly benefited by military service, character, mind and body being developed in a way which would never have otherwise been possible."

The Governor of the Uganda Protectorate, H.E. Sir Robert Coryndon, contributes a "foreword" greatly appreciative both of the character of the people and of the agricultural possibilities of their country.

- (i) HUNTER (William) [C.B., Col. A.M.S.]. **The Serbian Epidemics of Typhus and Relapsing Fever in 1915, their Origin, Course, and Preventive Measures employed for their Arrest. (An Aetiological and Preventive Study based on Records of British Military Sanitary Mission to Serbia, 1915).**—Reprinted from the *Proc. Roy. Soc. Med.* (Sect. of Epidemiol. & State Med.). 1919. Vol. 13. pp. 29–158. With 1 map and 21 charts. 1920. London: John Bale, Sons, & Danielsson, Ltd.
- (ii) STRONG (Richard P.) [M.D., S.D.], SHATTUCK (George C.) [A.M., M.D.] SELLARDS (A. W.) [A.M., M.D.], ZINSSER (Hans) [M.D.], HOPKINS (J. Gardner) [M.D.]. **Typhus Fever, with Particular Reference to the Serbian Epidemic.**—x + 273 pp. With 26 plates and 22 charts in text. 1920. Cambridge, Mass.: Published by the American Red Cross at the Harvard University Press.

These two publications, referring as they do mainly to the same outbreak of the same disease, may conveniently be considered together. Colonel Hunter's book is a purely epidemiological study, whilst that of Dr. Strong touches chiefly on the clinical and bacteriological aspects of the disease, though he gives in addition a short history of some earlier outbreaks, and at some length discusses the later epidemic in Poland.

There can be no doubt of the value of Colonel Hunter's monograph. It may be taken as a model of a paper of this kind. The essential points of the problem presented are clearly and briefly stated. From these we pass to the logical deduction of the measures necessary to cope with the problem, the organisation of these measures, and a record of the course of the epidemic before and after their application. It is all as clear as a problem in Euclid. If one were inclined to carp one might urge that the problems of epidemiology are not so clearly drawn as those of geometry, and that there is always the danger of falling into the *post hoc propter hoc* fallacy. Apparently Dr. Strong feels this, as in a note on page 88 of his work he throws doubt on the efficacy of Colonel Hunter's "key" measure, the stoppage of railway traffic.

Personally I believe that the cessation of the epidemic was mainly due to the dissemination of simple measures of disinfection throughout the whole country. Colonel Hunter's argument is supported by figures of cases treated in hospital, and fresh cases of disease occurring, on the several dates before and after suspension of railway traffic. I confess to a somewhat less simple faith in statistics, especially statistics gathered at a time of such appalling confusion and distress as the pages of both these books reveal. That Colonel Hunter's measures were well planned is clear, that they were carried out with untiring energy and devotion to duty, I, having worked both with him and Lieut.-Col. Stammers, feel confident, and it is no less obvious that they were followed by success. Whether the connection of cause and effect was so close as Colonel Hunter would have us believe, it remains a fact that no epidemic of equal severity has ever been cut so short.

Colonel Hunter's monograph is a model of statement, since it leaves the reader in no doubt as to what the writer means, why he acted, and how he acted—moreover, there is no superfluous padding. *O si sic omnes!*

Dr. Strong's work is of a totally different calibre. As I have said, a large portion (over one-third) deals with a clinical study of the disease, and this is very good. The systematic account of the complaint as it affects the various systems and regions of the body is very full, and the cases of which

detailed description is given are well selected. Equal praise can be accorded to the other sections on bacteriology. In fact the book presents the best systematic account of Typhus available.

Fault has, however, to be found with it on two most important points. Such a book ought to be a tool for use by subsequent workers. The ideal tool is handy, and unencumbered by unnecessary adornment. Now, the first essential for handiness in a book of reference is a good index, the second is clear headings and marginalia. This book contains neither, and without them it loses nine-tenths of its potential value.

The absence of an index is perhaps the worst defect, but this might be remedied if page headings and marginal headings gave an accurate guide to the contents. There is but one page heading: "Typhus" on the even numbered pages, and "The Serbian Epidemic" on the odd—till we come to page 109. Then we get "Clinical Observations" and "Typhus in Serbia," similarly distributed, up to page 175. It is true that paragraph headings are given in this second section, but these do not occur on every page. And so on. The Table of Contents does little to help.

As regards unnecessary adornments, there are numerous photographs, a few convey useful information; most, however, are of mere topical interest, such as "A Filled Cess-pool," which might be anywhere, "A Typical Serbian Village after Eradication of Typhus," which might be any Balkan village under almost any peaceful conditions. These come in "clumps," two, three, or even four plates at a time in the middle of the text. They add to the weight and thickness of the book, and as sometimes they come in the middle of a sentence they interrupt most annoyingly one's line of thought. The matter of the book is so good that it deserves a better form of presentment.

C. H. Melville.

MCCARRISON (Robert). [M.D., D.Sc., Hon. LL.D. (Belf.).] **Studies in Deficiency Disease.**—xvi + 270 pp. With 82 text-figs. 1921. London: Henry Frowde and Hodder & Stoughton. (Oxford Medical Publications.) The Lancet Building, 102, Bedford Street, Strand, W.C.2. [Price 30s. net.]

The aim of this handsomely produced work is, in the author's own words, "to present the reader with a consecutive account of the results of recent experimental researches into the nature of Deficiency Diseases, and to point out the application of these results to their prevention." Beyond a brief though succinct summary of the new knowledge relating to vitamins (antineuritic, antiscorbutic, and fat-soluble) and the various pathological processes and symptom-complexes to which the lack of these vitamins in the food gives rise, the subject-matter of the book consists in the main of detailed descriptions of the author's experimental work on "Deficiency" disease in the last few years, and the deductions he draws for the practical guidance of the practitioner in the treatment of a multitude of somewhat ill-defined human maladies.

Col. McCarrison approaches the subject of "Deficiency" disease from a standpoint which, as he himself admits, differs essentially from that of other laboratory workers less blessed perhaps with that clinical acumen and imagination necessary to translate with ease pathological findings and symptomatology, as exhibited by the small animals of the laboratory, to the human sphere. He is less concerned with the demonstration of an end-result, such as scurvy, polyneuritis, etc., brought about by exhibition of a diet wholly deprived of the particular vitamin concerned, than with the sundry pathological effects on the various systems of the body produced

by partially avitaminic or ill-balanced and deficient diets generally. A reference of this wide character necessitates naturally a peculiarly intensive study of the pathological physiology, morbid anatomy and histology of laboratory animals, following the exhibition of dietaries rendered variously foodless either in respect of specific vitamins or of certain proximate foodstuffs.

He has consequently throughout his experimental work with monkeys, pigeons and guinea-pigs paid peculiar attention to what he interprets to be genuine preneuritic or prescorbutic effects capable of direct application to human pathology. How far he has succeeded in this purpose only the accumulated experience of clinician, biochemist and experimental pathologist will tell, but there can be no question that McCarrison's methods of attack have opened up new ground, if its significance for human pathology is as yet but faintly understood. The book is divided into twenty-eight chapters, and numerous excellently reproduced photographs (mainly photo-micrographs of histological lesions) and carefully drawn and amply legended tables and charts are provided, together with convenient summaries of the matter discussed in each chapter.

The early chapters are devoted to introductory remarks on the main theme of the projected work and to a brief resumé of vitamin literature culled largely from the Medical Research Council's monograph. In these chapters he insists repeatedly "that the problems of nutrition must not be viewed from a too 'vitaminic' outlook," the vitamin being merely "one link in a chain of essential substances requisite for the harmonious regulation of the chemical processes of healthy cellular action," and he claims that the evidence he has to bring forward relating to the various pathological effects observed in animals will afford "a clearer comprehension of the manifestations of deficiency disease, using the term in its widest sense." Chapters follow in which are detailed his plan of experimentation with pigeons and monkeys and the dietaries to which he subjected them. These diets were essentially diets calculated to produce neuritic changes, and though nothing new emerges with the possible exception of certain symptoms interpreted as nerve lesions in monkeys (*e.g.*, wrist drop), which, I understand, no other worker has succeeded in eliciting, much useful information is given with regard to various factors (age, sex, idiosyncrasy, etc.) influencing the rapidity of onset of the neuritic syndrome and fatal issue in pigeons. The author discusses at some length the question of bacterial infection as influencing or modifying the effects of deficiency disease. In the course of his experiments with pigeons a *B. suispestifer* infection broke out among the experimental animals while the controls, while possibly carriers of this organism, remained free from infection. The presumption was that the resistance of the gastrointestinal tract to bacterial infection was so reduced by the food deficiency that a generalized infection supervened. It was of interest also that this particular strain of *B. suispestifer* could itself, when inoculated into healthy pigeons, produce paralysis—an effect which the author later employs in developing his argument relating to the different clinical types of beriberi. Here he postulates one form due to food deficiency alone, a second in which the neuritic effect is precipitated by infection, fatigue, etc., and a third which may be of purely infective origin. The latter form should, in the reviewer's opinion, be known simply as infective polyneuritis or polyneuritis of unknown origin and not as beriberi till further knowledge emerges.

Considerable space is devoted to the symptoms exhibited by experimental animals before any end-effect such as neuritis supervenes. Those observed include loss of appetite, diarrhoea, fall in the respiration rate, fall in body temperature, anaemia, asthenia, etc., but of all these he lays perhaps greatest stress on diarrhoea as being one of the earliest and most frequent manifestations of deficiency disease in pigeons. The diet of autoclaved rice exhibited contained according to the author no vitamins but an excess of starch and a deficiency of protein, fat and salts. In his

keenness to find a practical application to human pathology he suggests that "microbic fermentation of the ill-digested starch (as seen in the faeces of the animals) results in an excessive production of mineral and organic acids which, on absorption, may presumably lead to a condition of acidosis." That diarrhoeal conditions are liable to occur in animals on deficient diets is well known. On the other hand, especially in monkeys kept in captivity and normally dieted, outbreaks of amoebic and bacillary dysentery are not uncommon. In smaller animals, such as rats fed on certain defective diets, I understand from experts I have consulted that diarrhoea may occur, but it is by no means an invariable concomitant. Guinea-pigs on a scorbutic diet are, in fact, invariably constipated. In starvation it is known that diarrhoea and catarrhal affections of other mucous surfaces such as the conjunctivae, are very constant features, which readily yield, if the condition has not gone too far, to the exhibition of suitable food. The author, while rightly insisting on the importance of infection as liable to intervene with a gut whose resisting power is weakened by deficient dietary, must not generalize too readily in applying this experimental fact to human pathology. Even the demonstration by histological methods of congestive, haemorrhagic and ulcerative lesions in the gastro-intestinal tracts of experimental animals, to the minute description of which McCarrison devotes many chapters, cannot, in the reviewer's opinion, be held to represent anything more than casual disturbances due to a combination of factors of which bacterial infection is probably the most important. Nutritional diarrhoeas both in infants and adults were recognized long before the days of vitamins, but until we know more of the effect produced on the intestinal flora by deficient food or strange food of any kind it would be unwise to exclude other than dietetic procedures from the practitioner's armamentarium in the numerous vague intestinal upsets he has to deal with. Other symptoms, such as anaemia (determined by general pallor), asthenia, headache (judged from the fact that the monkey in question was observed to hold his head between his hands) are all duly chronicled as essentially symptoms following the exhibition of deficient food. Gravimetric observations on the organs of experimental animals yielded some highly important results and McCarrison's discovery of enlargement of the adrenals in pigeons fed on diets deprived of antineuritic vitamin is of particular interest as demonstrating the implication of the endocrine organs in deficiency disease. The increased adrenal content is, by McCarrison, brought into relation with malnutritional oedemas and the wet forms of beriberi as a possible causative factor, but it would appear from later work of KELLAWAY, who confirms McCarrison's observation, that the increased adrenal content is most probably a storage effect following lowered metabolism, and that the increased volume of the glands is due simply to oedema of these organs. McCarrison showed that inanition *per se* (exhibition of water only) was followed by increase in weight of the adrenals, so that this phenomenon cannot be set down primarily to lack of any particular vitamin. He demonstrated in fact that diets lacking in other specific vitamins are accompanied by adrenal enlargement.

The concluding chapters of the book deal with practical applications of the experimental results in animals to human pathology, and especially to the ill-defined group of acute and chronic intestinal disorder, intestinal stasis, ulcerative colitis, etc., where the author plumps rather unreservedly for dietetic treatment as best calculated to yield miraculous cure. In this sphere one may merely say that clinical opinion is at present hopelessly divided, and until further knowledge emerges, it would be unwise to ignore the trial of other weapons calculated to improve bodily tone and increase the power of resistance to bacterial infection.

OVERBECK-WRIGHT (A. W.). [M.D. (Pysch. Med.), M.B., Ch.B., M.P.C., D.P.H., Major I.M.S., Superintendent, Lunatic Asylum, Agra.] **Lunacy in India.**— x + 406 pp. 1921. London: Baillière, Tindall & Cox, 8, Henrietta Street, Covent Garden. [Price 21s. net.]

Major Overbeck-Wright has succeeded in covering a great deal of ground in a comparatively short space in his book, "Lunacy in India."

The chapter dealing with the statistical side of the matter is interesting, in that it shows how little provision is apparently necessary for the institutional care of the insane in India, a total accommodation for 7,243 out of a population of roughly 260 million people being ludicrous when judged by European standards. This is accounted for, however, by the fact that the native is so prejudiced against institutional treatment in cases of mental disorder, that only the more active and violent individuals are relinquished from home care, and that the degree of social complexity does not necessitate the alienation of so many of the feeble-minded as is the case in England.

The medico-legal aspect of the treatment of the mental case is dealt with very thoroughly, and as this is the issue which is most prominent from the general practitioner's point of view, the book should prove very helpful to all medical men who have to handle the mental case under the Indian Law. It is to be noted, however, that as the Indian is based on the English Lunacy Act, there are not many divergences between the two.

In a brief chapter the author considers the relationship of Western to Eastern psychoses, and he corroborates, from his long experience, the generally accepted view that, although the ideational content or the colouring of the mental state varies with the particular social surroundings of the patient, the general types of mental disorder are the same the wide world over. He describes the essentially Eastern condition of "Latah," which he considers is purely a special hysterical manifestation and the psychosis resulting from the Eastern habit of taking *Cannabis indica*. There is also an interesting reference to, and an explanation of, the curious prevalence of microcephalic imbecility in the Punjab.

Apart from the foregoing, the book may be regarded as a textbook of mental disorders in general, and in it Major Overbeck-Wright carries out his aims, as he avows in his preface, of drawing attention to the importance of toxæmias as ætiological factors in the production of a large proportion of the cases, and of placing on record the views he has gained from his experience of 19 years at this special work. Such being the admitted purpose of the book, it can be at once stated that, with all regard for the length of Major Overbeck-Wright's experience, and the value of the views he may have derived, his insistence on the toxæmic factor and his indifference to the progress of psychological knowledge detracts greatly from the worth this book might have had as a contribution to modern psychiatric medicine.

Not a great number of years ago psychology was a barren science applicable only to the laboratory and belonging only to the professor or to the abstract philosopher, it had no reference to the study of mental disorder, the clinical psychiatrist disregarded it and, being a medical man, he fell back on such explanations as were provided by pathology for his rationalization of cause and effect in mental disorder. This was the state of affairs in the year 1906 when BRUCE produced his work, "Studies in Clinical Psychiatry," in which all mental conditions save those arising from exhaustion or from actual trauma of a physical nature were ascribed to some toxic influence of some kind or another. BRUCE went so far as to say in his preface that only by divorcing psychiatry from psychology could real progress be made; fortunately, however, and due primarily to the utter failure of the bacteriologist to throw any real light on the matter, psychology has become very closely associated with the study of mental disorder. It

is now generally recognized that the psychoses proper are the manifestations of the failure of that most important function of living matter, that of maintaining the adaptation to the environment, and this failure is not to be ascribed to some adventitious toxæmia arising from the presence of bacteria or from a disturbance of the metabolic activities, but to some much more deeply seated defect in the biological structure. Thus, MORR has recently completed a research which goes definitely to show that the basis of the condition of Dementia Praecox is the failure of the power of the cortical cell to absorb oxygen, and so to continue functioning.

Major Overbeck-Wright has derived his ideas from and has based his own book on the work of BRUCE referred to above ; indeed, a comparison of the two books shows that the views expressed are practically identical. It is now the practice to regard the presence of a leucocytosis, on which BRUCE and Major Overbeck-Wright rely for their evidence to support their toxæmic theories, as an indication that the physical health of the patient requires careful attention lest the attempt to relieve the mental state be frustrated by the development of some fatal physical illness. Owing to the modern methods in vogue for the treatment of mental disorders, a more healthy existence is possible for the patient, so that a leucocytosis is not so commonly observed as formerly.

In dealing with the mental states associated with nervous disease, the book is quite sound and interesting, General Paralysis of the insane being regarded, for instance, as a primarily nervous disease with secondary mental manifestations. Even here, however, there is evidence of a failure to keep in touch with modern work, for, though the author definitely regards the condition as syphilitic in origin, yet he does not include any reference to the important fact of the finding of the *Spirochaeta pallida* in the cortex of the brain of the General Paralytic by NOGUCHI in 1913.

In conclusion it is to be said that Major Overbeck-Wright has produced a well-written and well-arranged book. He has stated his views dogmatically, admittedly a courageous thing to do in these days, and they are views which will find favour in certain quarters, but which, in the opinion of the reviewer, are not to be regarded as compatible with a true understanding of the nature of mental disorder as it is regarded by the consensus of modern psychiatric opinion.

Thomas Beaton.

As has already been announced, publication of the Lists of References will cease with the current volume (December). Should any Institution which publishes indexes of this kind wish to use for this purpose the MS. slips from which the Lists are made up, application should be made to the Bureau.

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES
BULLETIN.

Vol. 18.]

1921.

[No. 3.

RECENT WORK ON THE TREATMENT OF SLEEPING
SICKNESS: A CRITICAL REVIEW.By WARRINGTON YORKE, M.D.,
Sectional Editor, Tropical Diseases Bureau.

In recent papers MARSHALL and VASSALLO (1920-1921)* of the Uganda Protectorate describe a method of treatment of human trypanosomiasis which, it is claimed, gives results "better than any hitherto obtained by repeated intravenous or subcutaneous injections of salvarsan, atoxyl, antimony or other preparations." The importance of the subject and the extent of the claims which are made naturally attracted general attention to these papers, and according to an Annotation in the *Lancet*, 10th September 1921, the Colonial Office has already approved of the proposals made by a recently formed body—The Tropical Disease Prevention Association—to send a special mission under the direction of MARSHALL and VASSALLO, at an outlay of £50,000, to investigate the serum treatment of trypanosomiasis in man and animals.

It seems, therefore, that one might with advantage consider the papers in some detail and at the same time discuss, in the light of information which has been acquired during the past few years, a number of important questions which must occur to anyone who studies MARSHALL and VASSALLO's papers in a critical manner.

The work of MARSHALL and VASSALLO is based on two fundamental assumptions :—

1. Although the administration of one dose of salvarsan, neosalvarsan or atoxyl is sufficient to sterilize the blood-stream,

* MARSHALL (1920), *British Med. Jl.*, May 22, p. 702; MARSHALL (1921), *Trans. Roy. Soc. Trop. Med.*, May 20, p. 10; MARSHALL & VASSALLO (1921), *British Med. Jl.*, May 28, p. 773; MARSHALL (1921), *British Med. Jl.*, Aug. 20, p. 84.

symptoms reappear within a variable period, averaging about four months, and the disease progresses to a fatal termination.

2. This is because quite early in the disease the trypanosomes appear to gain an impregnable position in the central nervous system; in this position they are protected from the action of drugs and from it they are later able to infect the blood-stream again.

Acting on these hypotheses, MARSHALL and VASSALLO devised a mode of treatment which is essentially as follows:—

An intravenous injection of neo-kharsivan 0·6 gm. is given and three hours later 2 oz. of blood are withdrawn and allowed to clot for 20 hours: a volume, varying from 20 mm. to 20 cc. or more, of the serum separated from this blood is then injected intrathecally, after the withdrawal of a corresponding volume of cerebro-spinal fluid.

In subjecting this work to critical examination, we must naturally enquire first, whether the fundamental assumptions on which it is based are correct, and second, whether the results obtained by MARSHALL and VASSALLO justify the claims they make.

It has long been recognized that the results of treatment in advanced cases of sleeping sickness, showing pronounced nervous symptoms, are most unsatisfactory, and it has been generally assumed that the reason is that arsenic and antimony compounds, given by the ordinary channels, fail to reach the parasites in their sheltered position in the central nervous system.

It is doubtful, however, if MARSHALL and VASSALLO are correct when they state that the fact that the metallic medicaments do not reach the cerebro-spinal fluid is due to a pathological change in the meninges brought about by the trypanosomes in the central nervous system.* HALLIBURTON (1921) pointed out at a meeting of the Royal Society of Tropical Medicine and Hygiene, in the discussion which followed MARSHALL's paper, that the cerebro-spinal fluid is a secretion, and that both in health and disease the choroidal cells maintain their rôle of a stalwart barrier, keeping back foreign materials circulating in the blood: only one or two very volatile materials, *e.g.*, alcohol, get through, and there is no passage of poisonous materials like arsenic or antimony from the blood to the cerebro-spinal fluid. Professor Carl VOEGTLIN, on the contrary, informed the reviewer (3rd September 1921) that he had frequently found traces of arsenic in the cerebro-spinal fluid of normal rabbits and syphilitic patients after intravenous injection of large doses of salvarsan and neosalvarsan; and, further, that he had observed that intravenous injection of large doses of these drugs and of atoxyl caused within 24 hours a great diminution in the number of parasites in the cerebro-spinal fluid of rabbits which he had

* Some idea of the conflicting nature of the statements which have been made on this question can be gathered from a perusal of the following papers:—(1) CAMP, C. D. (1912), *Jl. Amer. Med. Assoc.*, Vol. 60, p. 241; (2) DANIEL, G. (1919), *Scalpel*, Aug. 24, No. 15; (3) HALL, G. W. (1915), *Jl. Amer. Med. Assoc.*, Vol. 64, p. 1384; (4) MEHRTENS & MACARTHUR (1919), *Arch. Neurol. & Psychiatry*, Chicago, October, Vol. 2; (5) NIERENSTEIN, M. (1908), *Annals Trop. Med. & Parasit.*, Vol. 2, p. 327. (1921), *British Med. Jl.*, June 5, p. 785; (6) SICARD & BLOCH (1912), *Munch. Med. Woch.*, July 23; (7) STILLMAN & SWIFT (1915), *Jl. Exper. Med.*, Vol. 22, p. 286.

inoculated subdurally with a heavy suspension of *T. equiperdum*. An account of this work is to be published shortly.

Possibly the explanation of the discrepancy may be found to lie in the dose of arsenic or antimony administered, small quantities of the drugs appearing in the cerebro-spinal fluid only after the administration of very large, or even toxic doses.

Regarding the question of re-infection of the blood-stream from the cerebro-spinal fluid, MARSHALL quoted KEITH as stating that "while the exact anatomy of the route is unknown, there is no doubt that infections in the basal cisterns do reach the cervical glands, and that very probably this occurs through the nerve-sheaths, where there is some connection between the cerebro-spinal fluid and the lymphatic systems." HALLIBURTON, however, points out that recent experiments by DIXON and himself (1916) showed that this does not take place, but that the cerebro-spinal fluid, which is constantly being secreted by the choroidal cells, does not find an exit by the nerves or lymphatics, but reaches the blood-stream direct *via* the microscopic arachnoid villi which project into the venous sinuses mainly at the base of the brain; this applied also to substances, *e.g.*, methylene blue, which were injected into the spinal fluid.

Leaving MARSHALL and VASSALLO'S first assumption for the time being, we will now proceed to enquire what evidence there is to warrant their second assumption, *viz.*, that post-treatment relapses are due to re-infection of the blood by parasites which have been protected from the action of the drug administered, owing to their secluded position in the cerebro-spinal fluid. So far as knowledge goes, there is no reason to doubt that this hypothesis may afford at least a partial explanation of the post-treatment re-invasion of the blood in cases in which the cerebro-spinal fluid itself is infected at the time of treatment; and evidence that trypanosomes can actually pass from the cerebro-spinal fluid to the blood has been obtained by REICHENOW (1914) who injected human blood into the spinal canal of a monkey and found trypanosomes in its blood 21 days later. That it is an adequate explanation why, to quote MARSHALL'S words, "attempts to cure patients infected with the trypanosome have, in the vast majority of cases, proved unsuccessful" cannot, however, be accepted without very careful and searching enquiry.

Although well-marked nervous symptoms suggest very strongly that the parasites have invaded the cerebro-spinal system, we can only be absolutely certain by performing a lumbar puncture and demonstrating their presence in the spinal fluid. If there are no nervous symptoms and lumbar puncture is negative, then there is no evidence that the nervous system is involved, and consequently there is no justification for explaining post-treatment relapses in such cases on the assumption that the blood was re-infected from the cerebro-spinal fluid. How early in the disease trypanosomes appear in the cerebro-spinal fluid is still unknown, but REICHENOW (1914) states that, as a rule, the parasites cannot be found in this fluid before the lapse of several months.

GRAY and TULLOCH (1907), who made repeated examinations of the cerebro-spinal fluid of a long series of sleeping-sickness patients in

Uganda, give details of two cases in which the cerebro-spinal fluid remained apparently free from trypanosomes for prolonged periods after the disease had been diagnosed by discovery of trypanosomes in the blood or gland juice: in the first case the disease was diagnosed on 15th April 1903, and seven examinations of the cerebro-spinal fluid made during 1903 and 1904 were all negative, trypanosomes being found in this fluid for the first time on 14th February 1905; in the second case the disease was diagnosed on 28th March 1903, and nine examinations of the cerebro-spinal fluid made during 1903 and 1904 were all negative. After 12th December 1904 the patient refused to allow further lumbar punctures, but he was still alive and in fair condition on 1st March 1906.

There are many records of treatment of cases of human trypanosomiasis in quite early stages of the disease—sometimes very shortly after infection—when there was nothing to suggest invasion of the nervous system, and yet it is common knowledge that post-treatment relapses are by no means infrequent in such cases. LURZ (1919) gives an account of the effect of treatment, with salvarsan and atoxyl, of seventeen early cases of human trypanosomiasis who exhibited no signs of disease of the nervous system, and whose cerebro-spinal fluid was normal and did not contain trypanosomes: in nine of the eleven cases treated with salvarsan trypanosomes reappeared in the blood within $1\frac{1}{2}$ months, and in four of the six treated with atoxyl within a month.

The treatment immediately after experimental infection of small laboratory animals, *e.g.*, rats and mice, in which there is no reason whatever for believing that the nervous system is involved, illustrates this point very clearly. The ease with which parasites are caused by medication to disappear from the blood of rats and mice is common knowledge, yet it is equally clearly recognized that the administration of many drugs (even the most efficacious, if administered in inadequate doses) is followed, after a more or less prolonged interval by a relapse, and the parasites reappear in the blood.

In such cases as the above there is, then, no evidence that the reappearance of parasites in the blood is the result of re-invasion from the cerebro-spinal fluid, and we are forced to conclude that the relapse is due either:—(1) to the fact that although the medication resulted in the destruction of the majority of the parasites in the blood, a few escaped—so few that their presence could no longer be recognized by the ordinary tests—and that these gradually multiplied when circumstances were favourable, with the result that they could once more be discovered by blood examination; or (2) that the parasites have hiding places other than the cerebro-spinal fluid, in which they can be protected from the action of drugs, or blood immune-bodies, and from which, when circumstances are favourable, they can again invade the blood. Which of these two alternatives is the true explanation of the occurrence of relapses, we cannot at present decide. It is, of course, obvious that the mere failure to discover trypanosomes in the blood does not mean that they are not present. MACFIE and GALLAGHER (1914) record that in none of 222 cases of trypanosomiasis in the Eket district of Nigeria were trypanosomes found in a drop of peripheral blood; the diagnosis in these cases was made by gland puncture, and it was often necessary to puncture a number of glands before trypanosomes were discovered.

BRODEN (1920) in an interesting paper records the result of examining 336 cases of sleeping sickness in the Belgian Congo : he found that the blood centrifugation method (using 10 cc. of blood) gave a positive result in 80·7 per cent. of cases, and gland puncture in 87·7 per cent. ; the ordinary method of direct examination of blood he regards as much less effective. SERGENT, DONATIEN and L'HÉRITIER (1920) state that microscopic examination of the blood of dourine horses in Algeria never revealed the presence of trypanosomes ; they add that the best method of making a diagnosis was by massive injections (200 cc.) of the blood of suspected animals into dogs. Instances innumerable might be cited to establish the fact that a mere negative microscopical examination of the blood simply implies that the parasites are not very numerous, and by no means that the blood is really sterile.

As regards the second alternative, the reviewer showed years ago (1911) that in goats infected with *T. rhodesiense* the parasites could multiply readily in the tissue spaces (cornea, subcutaneous tissue, etc.) and, at the same time, be either entirely absent from the blood or present in very small numbers only ; he suggested that in these situations the parasites might to some extent escape the action of the blood immunobodies. A similar demonstration of parasites in the tissues was made later by WOLBACH and BINGER (1912) and by STEVENSON (1917). It is, therefore, quite probable that there may be in the body backwashes of the circulation, or tissue spaces, where the trypanosomes can lie more or less protected from the action of drugs circulating in the blood.

Summarizing the situation, there appears no reason to doubt that the blood stream may be re-infected from the cerebro-spinal fluid, if the latter is already invaded, and that this may, in part at least, explain the relapses which occur after treatment in advanced cases ; such a mechanism cannot, however, explain the post-treatment reappearance of trypanosomes in the blood of earlier cases where there is no reason for believing that the nervous system is involved : in these cases the blood stream, provided it is really sterilized by the drug administered, must be re-infected from circulation backwashes, or from tissue spaces, where the parasites have been able to exist protected from the medicant circulating in the blood. Before leaving this question, one cannot but refer to the fact that trypanosomiasis is not the only protozoal infection which it is difficult to sterilize by the administration of drugs : it is a comparatively easy matter to cause the apparent disappearance of the malarial parasites from the blood by the administration of a few doses of quinine, or the apparent disappearance of *Entamoeba histolytica* from the faeces by a few doses of emetine, but although nobody has yet suggested—so far as the reviewer is aware—that these parasites take refuge in the cerebro-spinal fluid, relapses occur with commendable frequency.

Now, unfortunately, notwithstanding the fact that in each instance cerebro-spinal fluid was withdrawn immediately before the serum was injected, we are left in some doubt regarding the state of the cerebro-spinal fluid in MARSHALL and VASSALLO's cases at the time of treatment. It is true that in his first paper (1920) MARSHALL groups his earliest cases (13) into various clinical categories (A, AB, B, BB & C) and then adds " it is suggested that the central nervous system has been invaded in the AB class, though it is possible that this may occur even earlier."

Again, in a more recent paper (1921), it is recorded that the cerebro-spinal fluid was positive in eight of the cases, but the reviewer can find no record that the cerebro-spinal fluid in the other 48 cases was examined at the time of treatment; if this were done however, the inference is obviously that the examinations were negative. That the condition of the cerebro-spinal fluid before treatment in each of the 56 cases is not plainly recorded is a remarkable omission, in view of the fact that the whole object of the intrathecal injection of salvarsanized serum was to sterilize "the second focus of infection in the cerebro-spinal fluid." If the cerebro-spinal fluid were not infected, it is difficult to see what useful purpose an intrathecal injection of salvarsanized serum could be supposed to serve; presumably, it would simply be carried with the cerebro-spinal fluid, which is constantly being formed, back to the blood stream *via* the arachnoid villi.

We have now to consider what evidence there is to suggest that the procedure advocated by MARSHALL and VASSALLO will result in sterilization of cerebro-spinal fluid which is infected with trypanosomes. The evidence on the point adduced by these authors is not very convincing. As mentioned above, the cerebro-spinal fluid was definitely observed to be infected before intrathecal injection of salvarsanized serum in only eight cases (Nos. 7, 10, 30, 33, 39, 42, 44 and 45) and of these three died after treatment, three have not been re-examined since treatment (the time which has yet elapsed being only three or four months) and two are alive and well—with negative gland juice, blood and cerebro-spinal fluid—18 and 6 months respectively afterwards. These last two cases (Nos. 7 and 30) appear to be the sole definite evidence which MARSHALL and VASSALLO produce to substantiate their theory that intrathecal injections of salvarsanized serum result in sterilization of the cerebro-spinal fluid.

Before considering these cases in further detail, reference might well be made to REICHENOW's observations on intrathecal therapy of sleeping sickness recorded as long ago as 1914, and which, although they are very similar to those of MARSHALL and VASSALLO, have apparently escaped the notice of these workers. REICHENOW subjected a number of cases in the second stage of the disease to the following procedure:—

Two or three hours after an intravenous injection of neosalvarsan, an amount of blood sufficient to produce about 10 cc. of serum was withdrawn; after coagulation, the serum was removed from the clot, mixed with a little water containing .04 gm. of neosalvarsan and injected into the spinal canal, at least 10 cc. of cerebro-spinal fluid having been previously withdrawn.

It will be seen that this procedure is substantially the same as that recommended by MARSHALL and VASSALLO, the only difference being that REICHENOW adds .04 gm. of neosalvarsan to the serum before injection. In a later paper REICHENOW gives the results of these experiments: he states that after the intrathecal injections a decrease, or even total disappearance, of the trypanosomes in the cerebro-spinal fluid was observed, *but that the parasites always returned*—a fact which the author explains by the assumption that the medicant had not diffused all through the liquor cerebri, and more especially had not penetrated into the ventricles of the brain. Whatever the reason, it is

clear that in REICHENOW's hands intrathecal injection of salvarsanized serum appeared to be a failure.

Let us now return to consideration of MARSHALL and VASSALLO's two cases (Nos. 7 and 30) : in these the evidence is quite definite, trypanosomes were found in the cerebro-spinal fluid before treatment, but subsequent examinations were negative. As regards Case 7, treatment was administered on June 1st 1919, and the patient was re-examined on five occasions, the last of which was October 26th 1920 ; the dates of the earlier re-examinations are not given, nor is it stated whether the cerebro-spinal fluid was re-examined on each occasion. The information regarding Case 30 is more precise : treatment was administered on June 15th 1920, and the patient re-examined on November 3rd 1920. Apparently then, the immediate effect of the injection on the cerebro-spinal infection was not ascertained, but we are given the very important information that sixteen and five months respectively after treatment, examination of the cerebro-spinal fluid was negative in the two cases, as was likewise that of the blood and gland juice.

This record is obviously one of such importance that we are compelled to enquire closely into the nature of the observations on which it is based. Unfortunately, however, we can get no further than the somewhat laconic statement that trypanosomes were found in the cerebro-spinal fluid before treatment and were not found after treatment. In the absence of information regarding the method adopted for examining the cerebro-spinal fluid and the intensity of its infection before treatment, it is impossible to assess the value of the record. It is, however, easy to imagine that if the spinal infection is found to be very scanty at the first examination, a subsequent examination may be negative, and indeed in one of REICHENOW's cases (No. 24) this was actually the case. Four examinations of the cerebro-spinal fluid were made in this case—on the first occasion, September 20th 1913, two trypanosomes were found in 10 cc. of fluid, on the second, made January 10th 1914, the examination was negative, and on the other two made, March 16th 1914, and August 5th 1914, a single trypanosome was found in 10 cc. on each occasion.

REICHENOW (1921), as the result of careful examination of numerous cases of sleeping sickness in the Cameroons, has obtained important information regarding the conditions of their cerebro-spinal fluid. His observations can be briefly summarized as follows :—

1. The number of trypanosomes in spinal fluid varied in different cases from one or two to over a thousand in 12 cc. of fluid.
2. The number in any case remained almost constant for long periods.
3. The most striking feature of the parasites in the cerebro-spinal fluid was the large percentage which were in a state of division.
4. The absence of periodic variation in the number of trypanosomes in the cerebro-spinal fluid was due to the lack of trypanocidal antibodies which occur in the blood.
5. Notwithstanding their intense reproduction, the number of parasites in the spinal fluid is kept down by the action of the lymphocytes, which in the cerebro-spinal fluid of sleeping sickness cases are increased in number. The parasites become attached to the lymphocytes and are killed by them ; a definite phagocytosis does not occur, the bodies of the trypanosomes undergoing lysis.
6. Lumbar puncture in patients in a state of coma, or exhibiting well-marked somnolence, always reveals very numerous trypanosomes in the

spinal fluid. On the other hand, when only one or two parasites are found in 10 cc. of spinal fluid, there is no indication of somnolence: such persons are indeed, as a rule, symptomless and consider themselves healthy, so that for these cases one can use the term latent sleeping sickness. This condition, in which the parasites in the spinal fluid were so few as to cause no damage to the central nervous system, was observed by Reichenow to persist unaltered for about a year in several cases, and, he adds, it can evidently last a good deal longer.

This last observation has an important bearing on MARSHALL and VASSALLO's Cases Nos. 7 and 30, and leads naturally to the enquiry whether in the absence of intrathecal treatment an infected cerebro-spinal fluid ever becomes sterile. The defensive mechanism described by REICHENOW suggests that this may actually occur, especially if reinfection from outside is cut off as the result of treatment or immune-body formation. Unfortunately, precise information on the point is exceedingly scanty, as few observers appear to have controlled their treatments by lumbar puncture. REICHENOW (1914) in an earlier paper makes the statement that although the administration of atoxyl or salvarsan clears the blood of trypanosomes, it does not cause any reduction in the number of parasites in the spinal fluid; he does not give any details regarding his observation. However, on searching through the literature, a few records have been discovered of patients whose spinal fluid has been examined before and after treatment, and amongst these there are a number of instances in which an infected spinal fluid has become negative: details of these cases are collected in Table I.

The conclusions to be drawn from Table I appear to be that in the absence of intrathecal treatment (1) an infected cerebro-spinal fluid may actually become negative and (2) patients may live for prolonged periods, and possibly even recover, after the cerebro-spinal fluid has been invaded.

Considerations of this nature force one to the conclusion that MARSHALL and VASSALLO have brought forward no evidence to indicate that an intrathecal injection of neo-kharsivanized serum produces sterilization of the cerebro-spinal fluid.

Turning now to the main issue, let us consider whether the evidence recorded by MARSHALL and VASSALLO warrants the claim that their results "are better than any hitherto obtained by repeated intravenous or subcutaneous injection of salvarsan, atoxyl, antimony or other preparations." A glance at the report of the meeting of the Royal Society of Tropical Medicine at which MARSHALL read his paper shows that, with one or two exceptions, those who took part in the discussion were inclined to accept this claim at its face value. In subjecting it to critical examination, we must do so in association with what I have already referred to as the first of MARSHALL and VASSALLO's fundamental hypotheses, as it is undoubtedly from the standpoint of this hypothesis that the claim is made. Possibly, as MARSHALL writes, "*Most authorities are agreed that the administration of one dose of salvarsan, neo-salvarsan or atoxyl is sufficient to sterilize the blood stream, but within a variable period, averaging about four months, the symptoms reappear, and the disease progresses to a fatal termination.*" It is indeed certain that great numbers of natives died of sleeping sickness during the vast epidemics which ravaged the littoral of Victoria Nyanza during the early years of this century and which are still raging in certain portions of the Congo; and furthermore, we have abundant evidence that many

persons have died of the disease in regions where sleeping sickness is merely endemic. This, however, does not permit one to lay it down as a generalization, which may serve as a basis for studying problems of epidemiology, treatment and prophylaxis, that in the absence of any treatment, or after one or several doses of salvarsan, neo salvarsan or atoxyl, *a relapse occurs within about four months, the symptoms reappear, and the disease progresses to a fatal termination.*

In order to obtain the evidence which will permit one to speak authoritatively on this subject, it is obvious that we must have information regarding the fate of definite groups of cases which have been under observation for long periods; it is remarkable that precise information on this vital matter is not only very scanty, but is so scattered throughout the enormous literature dealing with sleeping sickness that it hardly can be unearthed by the ordinary worker in the field. The main reason for this appears to be the difficulty experienced, for one reason or another, in following up the cases of the disease for a sufficient length of time. The great majority of papers dealing with treatment simply tell us what happened within a comparatively short space of time, *e.g.*, that so many relapsed within a few weeks or months; they do not tell us the ultimate fate of the individual cases comprising the group treated.

The reviewer has asked himself three questions :—

- (1) What proportion of trypanosomiasis cases, which are untreated, die of the disease, or, conversely, are alive after more or less prolonged periods?
- (2) What proportion of cases, which are treated with one or several doses of arsenic or antimony compounds, die of the disease, or, conversely, are alive after more or less prolonged periods?
- (3) What proportion of cases, which are subjected to prolonged treatment, die of the disease, or, conversely, are alive after more or less prolonged periods?

Doubtless these appear to be simple questions, but to obtain any information which might enable us to answer them has been a surprisingly difficult task. As the result of laborious search, in which the reviewer has been greatly assisted by Miss D. ALLMAND, the librarian of the Liverpool School of Tropical Medicine, a certain amount of information has been collected from the literature, and this is summarized in Tables II-IV.

It will be seen from Table II that a proportion of cases of trypanosomiasis had survived in their natural surroundings, where they were presumably subject to re-infection, for very considerable periods without any treatment at all; some of the cases were in good health and, as far as could be ascertained, free from infection three to eight years after the disease had been diagnosed. The observations suggest that a certain percentage of cases may recover spontaneously.

Table III shows that a considerable percentage of cases had survived either in their natural surroundings, or in isolation camps, for periods varying from one to two years up to eight or nine years after they had received only one to several injections of some arsenical compound. Many of the cases were well and apparently free from infection at the end of the observation period. It will be observed that to some extent different results were obtained by different observers; probably these differences are to be explained, in part at

least, by the condition of the patients when treated, *e.g.*, compare the results obtained with arsenophenylglycin by AUBERT and HECKENROTH in their first series of observations (1911) with those obtained by them in 1913, and with those of V. d. HELLEN (1913). The figures published by CLAPIER in 1921 are most illuminating in so far as they give the fate of a large group of unselected cases, left in their natural surroundings, $6\frac{1}{2}$ years after treatment with only one to three injections of atoxyl. The general conclusion to be drawn from the observations presented in Table III appears to be that the great majority of early cases (and even of unselected cases) are alive and well, and many of them apparently free from infection, one to two years after treatment with a few doses of an arsenical compound; and the fact that many have survived for such long periods as $6\frac{1}{2}$ to 9 years and are apparently well and free from infection suggests that not a few had actually recovered.

Table IV shows that the majority of the early cases subjected to prolonged arsenic or antimony treatment were alive and well $1\frac{1}{2}$ to 7, or more, years after the condition was diagnosed. It is not easy to explain the extraordinarily high mortality among the Uganda cases; it will be seen, however, that practically all the cases were well advanced and many of them very ill before treatment was commenced. Furthermore, the observations were made during a terrible epidemic and the natives were collected into isolation camps. Possibly during the epidemic the trypanosome developed an exalted virulence, and possibly the resistance of the native was lowered by removing him from his natural surroundings and providing him with food which was in some respects inadequate; these are questions, however, which are beyond the scope of the present review. In considering the comparatively heavy mortality among the 50 Europeans cited by BAGSHAWE (1910), it must be remembered that many of the cases occurred in early years before the discovery of the value of atoxyl (1905); and this also applies to three of the four fatal cases cited by DANIELS (1915).

It is clear from the information presented in Tables II to IV that MARSHALL's first fundamental hypothesis cannot be accepted without very considerable qualification, as apparently a large proportion of trypanosomiasis cases have survived, either in their natural surroundings, or in isolation camps, for prolonged periods, after receiving only a single, or at most several, injections of some arsenic or antimony compound.

In the absence of controls it is almost impossible to appraise the value of treatment. For example, are we to infer that the fact that at least 34.6 per cent. of OUZILLEAU's 1,078 cases were alive, and most of them well and apparently free from infection, $6\frac{1}{2}$ years after diagnosis, is due to the one to three injections of atoxyl which they had received at the time diagnosis was made? It is impossible to answer this, unless we know how many would have been alive after a similar period if no treatment had been given. Doubtless there are serious objections to the use of controls in therapeutic experiments in a disease like sleeping sickness, but one cannot help feeling that if such work were properly controlled by observations of an adequate series of untreated cases, it would be an inestimable advantage in determining the value of treatment.

Returning now to MARSHALL and VASSALLO's contention that their intrathecal treatment has given results better than any hitherto obtained by repeated injection of salvarsan, atoxyl and antimony or

other preparations, let us examine the figures upon which this claim is based. Of the 52 (presumably unselected) cases treated by intrathecal injection, 22 have so far not been re-examined, as they were treated within 1 to $3\frac{1}{2}$ months of writing the report, and we know nothing about them, except that one is dead; of the remaining 30 cases, 6 (20 per cent.) are dead, 2 have not been re-examined, and the others (22) are alive and well after observation periods which in 2 cases were 24 to 27 months, in 7 cases 12 to 19 months, and in 13 cases $6\frac{1}{2}$ to 8 months.

Now it is remarkable that amongst MARSHALL's cases are two controls (Nos. 14 and 28) who received only a single intravenous injection of neokharsivan: both were alive and well, with negative blood, gland juice and cerebro-spinal fluid, 13 and $7\frac{1}{2}$ months respectively after treatment. One would imagine that this alone might well have given MARSHALL and VASSALLO pause, and have prevented them from making a claim which, on the data which they have so far accumulated, is absolutely unjustifiable. If further evidence on this point is required, we have only to compare MARSHALL and VASSALLO's figures with those summarized in Tables III and IV and particularly with those of AUBERT and HECKENROTH (1913) and ZUPITZA (1920) in Table III, and of CLAPIER (1921) in Table IV, the observation period for which is at least equal to that of MARSHALL and VASSALLO, to realize how utterly unwarrantable is the statement that the intrathecal treatment has given better results than any hitherto obtained by repeated injection of salvarsan, atoxyl, antimony or other preparation.

Having regard to economy of space, the reviewer has purposely refrained from discussing the case of the European (Mr. X) to which MARSHALL appears to attach so much importance. That there is no justification for asserting that the apparent cure had anything to do with the intrathecal injection of salvarsanized serum must be obvious to anyone who reads the records of the case, for the following reasons:— (1) The case was an early one; (2) there is no evidence that the cerebro-spinal fluid was ever invaded; (3) trypanosomes were found in the blood 39 and 88 days respectively after the intrathecal injection; and (4) many cases are on record which have lived in perfect health for as long as, or indeed much longer than, Mr. X, and have been apparently cured by a single injection of neosalvarsan, or some other arsenical preparation (*vide* Table III, especially ZUPITZA, 1920, and CLAPIER, 1921).

Conclusions.

The main criticisms which can be levelled at MARSHALL and VASSALLO's papers can be summarized as follows:—

- (1) The work is based on two fundamental assumptions, both of which are incorrect, or at least can only be accepted with very considerable qualification.
- (2) The treatment is not new, even for trypanosomiasis, but is substantially the same as that tried by REICHENOW in 1914, and abandoned by him as useless in that it failed to sterilize the cerebro-spinal fluid.
- (3) MARSHALL and VASSALLO produce no satisfactory evidence that intrathecal injections of salvarsanized serum sterilize infected cerebro-spinal fluids.
- (4) The results, so far published, fail to substantiate the claim that the treatment gives better results than any hitherto obtained by other methods.

TABLE I.—Giving records of cases in which trypanosomes disappeared lived for prolonged periods after their

Author.	Number of cases showing trypanosomes in the cerebro-spinal fluid before treatment.	Treatment.	Case.
Gray & Tulloch, Uganda, 1907 ..	3	No treatment	A
		" "	B
		" "	C
Broden & Rodhain, Leopoldville, Belgian Congo, 1908.	3	Atoxyl: 8 injections of 0.5 gm., followed by orpiment orally till the 31st day.	A B C
Martin & Leboeuf, Brazzaville, French Congo, 1909.	1	Atoxyl and afridol violet, repeated injections.	
Broden & Rodhain, Leopoldville, Belgian Congo, 1909.	1	Atoxyl: 31 injections 0.5 gm. ..	
	4	Atoxyl: 0.4 to 0.5 gms. and emetic, 0.1 gm., repeated injections.	A
		" "	B
		" "	C D
Martin, Leboeuf & Ringenbach, French Congo, 1909.	31 10 died. 11 disappeared. 10 re-examined, of which 3 were found to be negative.	Atoxyl and emetic: several injections	A B C
Martin & Darré, 1910	1 European with marked somnolence	Atoxyl: repeated injections during 8 months.	
Todd, Congo, 1911	1	Liquor arsenicals, at intervals ..	
Martin & Darré, 1914	1 With marked nervous symptoms.	Irregular treatment	

TABLE II. follows TABLE IV.

from the cerebro-spinal fluid after treatment; and also of cases who cerebro-spinal fluid was found to be infected.

Condition of the cerebro-spinal fluid.					Remarks.
1st exam. before treatment.		Later observations after treatment.			
Trypanosomes per 10 c.c.	Cells per c.mm.	Time after 1st exam.	Trypanosomes per 10 c.c.	Cells per c.mm.	
+	Very few	61st and 79th days	0	Very few	Further examinations between the 321st day and death on the 705th day all positive.
		157th day	+	" "	
		194th and 243rd days	0	" "	
+	" "	61st day	0	" "	Alive.
		100th and 136th days	+	" "	
		161st and 200th days	0	" "	
+	" "	230th day	+	" "	Alive.
		99th, 124th and 164th days	0	" "	
		195th day	+	" "	
+	750	53 days	0	196	
+	193	53 "	0	32	
+	625	53 "	0	30	
+	Abundant	41 days	0		
+	640	{ 7 months	0	38	Considerably improved.
		9 "	0	65	
+	226	{ 34 months	0	38	Condition stationary.
		64 "	0	125	
+	187	{ 34 "	0	28	In good health.
		64 "	0	9	
+	500	{ 34 "	0	30	Considerably improved.
+	245	34 "	0	53	
+ very rare		{ 10 months	0		In good health.
		12 "	0		
+		{ 7 "	0		In good health.
		9 "	0		
+		{ 6 "	0		In good health.
		7½ "	0		
+					Alive and well 4 years later.
+					Alive and well 5 years later.
+	Numerous				Still alive after 4 years; condition unchanged.

TABLE III.—Showing the fate, after more or less prolonged .
had received only one or several injections

Author.	Number of cases and by whom treated.	Condition of cases at time of treatment.	Treatment.	Length of observation period of survivors.
Aubert & Heckenroth, French Congo, 1911.	33, Martin & Ringenbach, 1909	All in 2nd or 3rd stage of disease	Arsenophenylglycin : a series of injections at irregular intervals; 0.5-4 gm.	2 years
Montfort, French Congo, 1912	253, Aubert, 1911	Unselected cases during an epidemic	Atoxyl. 1 injection; ? dose	5-6 months
Aubert & Heckenroth, French Congo, 1913.	29	15 : good condition 14 : bad "	Arsenophenylglycin : 2 injections at 4 or 5 days' interval; 0.45 gm. per kilo.	11 : 6-11 months 9 : 12-15 " 5 : 18-25 "
	11	9 : in 2nd stage 2 : in 3rd stage	Atoxyl : 7-14 injections	3 : 8-12 months 8 : 14-20 "
v. d. Hellen, Togoland Camp, 1913.	233, v. Raven, 1911	Almost all in an early stage	Arsenophenylglycin : 2 injections on successive days; 0.04-0.06 gm. per kilo.	6 : 3-6 months 34 : 7-8 " 33 : 9-11 " 111 : 12-23 " 10 : 24-35 "
Lafont & Dupont, Senegambia, 1914.	34	5 : very advanced 15 : advanced 2 : moderate 12 : early cases	Ludyl or galyd : 4 injections; various doses	12-19 months
Zupitza, Togoland Camp, 1920.	19	In 1st stage of disease, but with definitely enlarged glands	Neosalvarsan : 2 intramuscular injections; 8-9 mgm. and 12-13 mgm. per kilo.	11-12 months
	25	" "	Neosalvarsan : 1 or 2 intramuscular injections; about 15 mgm per kilo.	15-16 months
	20	" "	Salvarsan : 2-5 intravenous injections; 8.0-8.3 mgm. per kilo	18-19 months
Simson, Yei Camp, Sudan, 1920.	17, Yei Camp, 1911	.	Salvarsan : 3 intramuscular injections suspended in olive oil; 0.5-0.6 gm.	8 years
	4, Yei Camp, 1911		Arsenophenylglycin : 2 injections, 1 gm and tryparosan, orally on 3 successive days, 8-9 gm.	9 years
Clapier, French Congo, 1921	1,078, Ouzilleau, 1913-14	Unselected cases during an epidemic	Atoxyl : 1-3 injections; 1 gm. for an adult, 1.5 to 2 cgm. per kilo. for a child	6½ years

* This figure is calculated on the assumption that those which had disappeared,

periods, of various Groups of Sleeping Sickness Cases which of some Arsenic or Antimony Compound.

Number. disappeared.	Number dead.	Number alive.	Percentage of original total alive assuming that all who had disappeared had died.	Percentage of original total alive assuming that all who had disappeared were alive.	Remarks.
2	25	6	18·2	24·2	Of those alive, 3 in bad condition, 1 moderate, 1 well.
81	24	148	58·5	90·5	Of the 148 alive, only 25% were found to be still infected.
0	4	25	86·2		The 4 dead were all bad cases when treatment began. Of the 25 alive, 22 were in good condition.
0	0	11	100·0		Of the 11 alive, 6 were in good condition with negative blood.
2	8 of other diseases. 29 relapsed and were put on other treatment	194	83·2	96·6*	None of the 194 had relapsed; all were well and considered cured.
0	15	19	55·9		Of the 15 dead, 9 were advanced cases before treatment. Of the 19 alive, 4 were still infected.
0	0	19	100·0		Of the 19, 16 had not relapsed and were considered to be cured; 3 had relapsed, were re-treated and provisionally cured.
0	0	25	100·0		Of the 25, 21 had not relapsed and were considered to be cured; 4 had relapsed, were re-treated and provisionally cured.
0	0	20	100·0		Of the 20, 19 had not relapsed and were considered to be cured; 1 had relapsed, was re-treated and provisionally cured.
0	9	8	47·0		Of the 8, 5 in good, 3 in fair condition.
0	2	2	50·0		The 2 in good condition, but 1 died during the 8th year of small-pox.
167	538	373	34·6	50·0	Of the 373 alive, only 70 were found to be still infected.

and those which had relapsed and were put on other treatment, were all alive.

TABLE IV.—Showing the fate, after more or less prolonged had received more or less

Author.	Number of cases and by whom treated.	Condition of cases at time of treatment.	Treatment.	Length of observation period of survivors.
Hodges, Uganda: all S.S. Camps, 1910.	1,185 admitted Dec. 1906 to Nov. 1907.	140: in apparently good health. 517: with definite signs of disease. 528: advanced cases.	Various prolonged treatments, chiefly arsenical.	(a) after 2 years. (b) after 4 years.
Hodges, Uganda: Busiro Camp only, 1910.	399 admitted Dec. 1906 to May 1907.	65 with definite signs (e.g. fever, enlarged glands) 177: more advanced (drowsiness, impotence, tremor of tongue). 109: advanced cases, very ill, with marked nervous symptoms 16: semi-comatose. 32: condition not stated.	Various prolonged treatments, chiefly arsenical.	3½–4 years.
Bagshawe, 1910	50 Europeans, treated by various workers.	—	Various prolonged treatments.	3–7 years.
v. d. Hellen, Misahöhe Camp: Togoland, 1913.	57	Almost all early cases.	Atoxyl: 15–20 double injections every 10th and 11th, or 11th and 12th days; 0.5 gm.	7: 37–42 months 22: 43–48 months
Macfie and Gallagher, Ikotobo Camp, Eket, 1914.	167	Unselected cases	Atoxyl: weekly injection, 6 grs.	8–19 months.
Daniels, 1915	13 Europeans, treated at the London School of Tropical Medicine.	—	Prolonged arsenical, mostly atoxyl.	2: 5–6 years 5: 9–10 " 2: 12–14 "
Greggio, Belgian Congo, 1917	51, Greggio, 1907 36, " 1908 29, " 1909 39, " 1910 90, " 1911 51, " 1912 79, " 1913 50, " 1914	Mostly early cases from personnel of Mission. Unselected cases from the surrounding districts.	Repeated doses of arsenic. " " " " " " " " " " " " " " " " " "	8 years. 7 " 6 " 5 " 4 " 3 " 2 " 1 "
Simson, Yei Camp: Sudan, 1920.	35, Ranken, 1913	15: early cases with enlarged glands. 20: more advanced with nervous symptoms.	Metallic antimony: 5 injections at intervals of 4 days; an interval of 6 weeks; 3 injections at intervals of 4 days; 1 grn.	7 years.
	29, Ranken, 1913	Selected cases	Metallic antimony: 15 injections at intervals of 3 days, 1 grain; and salvarsan, 2 injections, 0.4 gm.	6 years.
	23, Ranken, 1913	Selected cases	Three courses each consisting of metallic antimony, 5 injections, 1 grain; and atoxyl, 12 injections, 5 grs.	6 years.

periods, of various groups of Sleeping Sickness cases which prolonged courses of treatment.

Number disappeared.	Number dead.	Number alive.	Percentage of original total alive assuming that all who had disappeared had died.	Percentage of original total alive assuming that all who had disappeared were alive.	Remarks.
182 224	734 912	269 49	22.7 4.1	38.2 23.0	Of the 49 alive, 3 were in good health, 19 showed definite signs of disease, and 27 were advanced cases.
65	313	21	5.2	21.5	Of the 21 alive, all showed signs of disease.
7	30	13	26.0	40.0	28 died within 2 years of diagnosis: 4 within 2-6 years. Probably at least a dozen of the deaths occurred before the introduction of atoxyl as a remedy.
7	5 of other diseases 16 relapsed and were put on other treatment.	29	50.9	91.2	None of the 29 had relapsed: all were well and considered cured.
0	9	158	94.6		All in fair health.
0	4	9	69.2		3 of the 4 cases died before the introduction of atoxyl in 1905.
0 0 0 0 0 0 0 0 0	31 20 19 27 52 34 50 34	20 16 10 12 38 17 29 16	39.0 44.4 34.4 30.7 42.2 33.3 36.7 32.0		
77	20	8	22.8	42.8	Of the 8 alive, 6 in good condition.
0	11	18	62.0		All in good condition, but 2 died in 8th year of small-pox and cerebro-spinal meningitis.
0	4	19	82.6		17 in good, 2 in fair condition.

TABLE IV.—Showing the fate, after more or less prolonged had received more or less

Author.	Number of cases and by whom treated.	Condition of cases at time of treatment.	Treatment.	Length of observation period of survivors.
Simson, Yei Camp: Sudan, 1920— <i>cont.</i>	96, Ranken, 1913	Unselected cases	Metallic antimony and atoxyl: more or less continuous treatment for 2 years	6-7 years.
	63, Yei Camp, 1912.	35: good condition. 27: fair condition. 1: poor condition.	Atoxyl: subcutaneous injections every 10 days for 3 months, repeated after an interval of 1 month; 1 gm.	7-8 years.
	11, Yei Camp, 1913	5: good condition. 6: fair condition	" "	7 years.
	7, Yei Camp, 1914.	1: good condition. 6: fair condition	" "	6 years.
	19, Yei Camp, 1915.	—	Atoxyl: subcutaneous injections every 3 days up to 2 years; 5 grs.	5 years
	5, Yei Camp, 1916.	—	Salvarsan: 2 injections at 10-day intervals; and atoxyl, injections every 3 days for 1 year; 5 grs	3 years.
Clapier, French Congo, 1921	3147	Unselected cases	Atoxyl: repeated injections averaging 2-6 per case each six months: 1 gm. for adult, 1.5-2 cgm. per kilo. for child.	17-18 months

TABLE II.—Showing the fate, after more or less prolonged periods, of

Author.	Number of cases and by whom observed.	Condition of cases at time of first observation	Treatment.	Length of observation period of survivors.
Nattan-Larrier, French Congo, 1908	3 Europeans ..	—	Nil.	A: 17 months. B: 3 years. C: 2 years.
Todd, 1911	5, Dutton & Todd, Gambia, 1902.	—	Nil.	2-3 years.
	102, Dutton & Todd, Congo, 1903.	—	Nil.	30-40 months.
Heckenroth, Oubangui, French Congo, 1913.	35, Leboeuf, 1907..	—	Nil.	6 years.
Wade, Ashanti, 1913	97, Kinghorn, 1910	—	Nil.	3 years.
	32, Wade, 1911-12..	—	Nil.	1-2 years.
Greggio, Belgian Congo, 1917 ..	33, Greggio, 1911 ..	—	Nil.	4½ years.
Todd, Gambia, 1919	12, Todd & Wollach, 1911.	—	Nil.	8 years.
Kleine, New Cameroons, 1919 ..	565, Montfort, 1911	—	? Nil.	3 years.

periods, of various groups of Sleeping Sickness cases which prolonged courses of treatment.—*cont.*

Number disappeared.	Number dead.	Number alive.	Percentage of original total alive assuming that all who had disappeared had died.	Percentage of original total alive assuming that all who had disappeared were alive.	Remarks.
2	43	51	53·1	55·2	33 in good, 13 in fair, 5 in poor condition.
0	23	40	63·5		20 in good, 6 in fair, 3 in poor condition; 2 died in 8th year from small-pox and large burn.
0	5	6	54·5		All the 5 in good condition.
0	3	4	57·1		2 in good, 1 in fair, 1 in poor condition.
0	6	13	68·4		6 in good, 3 in fair, 4 in poor condition.
0	1	4	80·0		2 in good, 2 in fair condition.
0	509	2,638	83·8		Of the 509 dead, 75 per cent. died during the first 6 months and only 25 per cent. during the next 12 months.

various groups of Sleeping Sickness cases which remained untreated.

Number disappeared.	Number dead.	Number alive.	Percentage of original total alive assuming that all who had disappeared had died.	Percentage of original total alive assuming that all who had disappeared were alive.	Remarks.
0	0	3	100·0		A and B had relapsed with cerebral symptoms; C was well.
0	1	4	80·0		Of the 4 alive, all were well, but by the end of 7 years all had died from unknown causes.
?	?	?	33·0		5 were known to be well and working after 4 years.
8	21	6	17·1	40·0	All the 6 in good health.
?	?	20 " at least "	20·6 " at least "		
?	?	9 " at least "	28·1 " at least "		
0	24	9	27·2		
0	8	4	33·3		The 4 alive all in good health.
?	50·7 per cent.			49·3	This figure (49·3) is based on Kleins's statement that in 1914 50·7% of Montfort's cases were dead.

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MEDICAL ZOOLOGY.

JOHNSON (J. Pratt). **The Routine Examination for Blood Parasites of all Troops returned from a Tropical Campaign.**—*Jl. Roy. Army Med. Corps.* 1921. April. Vol. 36. No. 4. pp. 282–290.

The object of this paper is to record a practical experience of routine blood examination on the large scale, where the number of smears to be dealt with approached 250,000.

Special laboratories were established, adjacent to central hospitals: here recruits, mostly ladies, were trained for the work. The thick smear method was adopted, supplemented only in special cases by films. The smears were merely dried thoroughly, but without direct exposure to sun; only if—as in prolonged drying in hot weather—they became discoloured were they haemolysed with acid alcohol. Two watery staining solutions were kept in stock, one of one per cent. eosin, the other of one per cent. Azur II, the latter being made afresh about once a week. For staining, 2 cc. of the former were diluted with 220 cc. of distilled water and 4 cc. of the latter added: the simply dried smears were flooded for 20 to 30 minutes, and were haemolysed as well as stained by the process; finally, the smears were removed to distilled water until they began to show pink. In each case laboratory reports were entered along with treatment-record on a special card.

For smooth working, laboratory reports were generally made within 24 hours; in one instance a batch of 1,000 smears was dealt with and reported on in that time at one laboratory.

The laboratory medical officers were always available for bedside consultation when required.

Good smears could be made by a capable N.C.O. or a sister, and the necessary laboratory forms completed by them or by a convalescent.

A. Alcock.

SCOTT (Henry Harold). **The Incidence of Intestinal Parasites, especially with regard to the Protozoa, amongst Symptomless Carriers in Jamaica.**—*Ann. Trop. Med. & Parasit.* 1921. July 16. Vol. 15. No. 2. pp. 117–132.

This is a minutely particularized account of a very careful investigation of the stools of 102 hospital cases of both sexes, none of which was under suspicion of, or admitted for, any intestinal complaint. In the investigation the concentration method of CROPPER and ROW was followed, and in each and every case nine separate stools were examined at regular intervals during a term of three weeks. Cysts of *Entamoeba coli* were found in 47·00 per cent., *E. histolytica* in 14·7 per cent., *Giardia intestinalis* in 35·29 per cent., *Chilomastix mesnili* in 12·74 per cent., and *Balantidium coli* twice.

A. A.

MORSTATT (H.). **Die Rolle der tierischen Parasiten und Krankheitsüberträger im ostafrikanischen Feldzuge.** [The Rôle of Animal Parasites and Disease Carriers in the East African Campaign.]—*Zeitschr. angew. Ent.* Berlin. 1921. Feb. Vol. 7. No. 2. pp. 287–295. [Summarized in *Rev. Applied Entom.* 1921. June. Vol. 9. Ser. B. Pt. 6. pp. 92–93.]

Malaria was the most important disease; benign tertian appeared to have increased. Blackwater caused many deaths. The commonest

tsetse-fly is *G. morsitans*. *G. brevipalpis* also is widespread. *G. austeni* occurs in the north of Tanganyika Territory and in British East Africa.

Ceratopogon was sometimes very troublesome. Phlebotomus fever occurred at Dar-es-Salaam. *Cordylobia anthropophaga*, *Auchmeromyia luteola*, and *Tunga (Dermatophilus) penetrans* were pests. Even Europeans were troubled with body-lice. *Ornithodoros moubata* is the only relapsing-fever tick in East Africa, and there were several cases of that disease among Europeans.

A. A.

LAVIER (Georges). **Les parasites des invertébrés hématophages ; parasites qui leur sont propres ; parasites qu'ils transmettent aux vertébrés.**—218 pp. 1921. Paris: Vigot Frères, Editeurs, 23 rue de l'Ecole-de-Médecine. [Price not stated.]

This is a most useful catalogue of the known species of blood-sucking Annelids and Arthropods, arranged according to zoological system. In the case of each species what is known about it, both as a mere harbourer of specific parasites of its own, and as a transmitter or intermediate host of parasites of vertebrates, is circumstantially stated, all statements being appropriately referred to their original sources in a bibliography that fills 35 pages. Minor items are a brief biological classification of these blood-sucking invertebrates, and an impartial discussion of the ulterior significance of insect flagellates. It is a very valuable compilation.

A. A.

JUNG & SELL. **Zur Kenntnis des Vorkommens von Darmparasiten in Südbayern.** [Study of the Incidence of Intestinal Parasites in Southern Bavaria.]—*Münch. Med. Woch.* 1921. Apr. 29. Vol. 68. No. 17. pp. 511-512.

Examinations made at Munich of the stools of Bavarians and Swabians, which had been sent in for the purpose of diagnosis from cases of typhoid, paratyphoid and dysentery; a few only were sent for examination for evidence of worms. The stools of 380 cases were examined; 65 contained eggs of various worms, 66 cysts of protozoa, and 8 contained both. Of worms *Ascaris* was found in 29 cases, *Trichocephalus* in 46, and *Oxyuris* in 4. Of protozoan cysts *Entamoeba coli* was found in 66 cases, and *Lambliia* in 13.

Two examinations were made of each stool.

A. A.

MESNIL (F.). **Variété des voies d'accès des parasites sanguicoles à leurs hôtes.**—*Bull. Soc. Path. Exot.* 1921. June 8. Vol. 14 No. 6. pp. 310-315.

Though there is much that is interesting and suggestive, there is nothing novel in this paper. After a cursory review of the biological methods by which the various kinds of blood-parasites gain access to their proper hosts, the author concentrates on the trypanosomes, and on the question whether, as LEGER conjectured, the primitive hosts of these parasites are invertebrate, or vertebrate, as MINCHIN thought more probable.

Reasoning from four well-established propositions, namely, (1) that the rat is infected with its specific trypanosome by swallowing infected faeces of the rat flea, (2) that intestinal flagellates of certain vertebrates are known to invade the blood of their host, (3) that each class of vertebrates has at least one group of trypanosomes particular to itself, and (4) that in one and the same class of vertebrates the specific trypanosome parasites, notwithstanding their common facies are severally communicated by specific arthropods of very different orders, the author supports the view of MINCHIN.

A. A.

NÖLLER (W.). **Neuere Forschungen auf dem Gebiete der Blutparasiten unter den Sporozoen.** [Recent Investigations on the Position of the Haemoparasites in the Sporozoa]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1920. Vol. 24. No. 11. pp. 353-355. With 1 text fig.

Another illustrated argument for the derivation of haemoparasitic Sporozoa from enteroparasitic Sporozoa.

A. A.

i. KRAUS (R.), DIOS (R.) & OYARZABAL (J.). **Ueber ein unsichtbares Stadium bei pathogenen Protozoen (Piroplasma, Anaplasma und Trypanosomen).** [On the Ultramicroscopical Stages of Pathogenic Protozoa (Piroplasma, Anaplasma, and Trypanosomes).]—*Muench. Med. Woch.* 1921. July 15. Vol. 68. No. 28. pp. 867-868.

ii. KLEINE (F. K.). **Bemerkungen zu dem Aufsatz von Professor R. Kraus, Dr. R. Dios und J. Oyarzabal.**—*Ibid.* 1921. Aug 26. Vol. 68. No. 34. p. 1085.

i. After a brief historical review of the hypothesis of ultra-microscopic stages of protozoon infections, the following experiments are recorded:—

1. A sheep after receiving a subcutaneous injection of blood from an ox infected with many "pirosomata" subsequently exhibited no positive result to continuous examination. But an ox receiving a subcutaneous injection of blood from this sheep exhibited anaplasma 38 days afterwards, which remained demonstrable for a month; and a calf injected from the same sheep also showed anaplasma (28 days afterwards) which remained visible for 20 days.

2. Again, another sheep inoculated from an ox which had been infected with piroplasma, but at the time showed only anaplasma in the blood, gave negative results; yet the blood of this sheep infected a calf with anaplasma, and this anaplasma infection was passed on from the first calf through two other calves.

3. A sheep was injected subcutaneously with blood of a horse infected with *Trypanosoma equinum*; the result was negative. Yet guinea-pigs inoculated a month afterwards with the blood of this sheep showed trypanosomes in their blood in the course of 18 days. Of three more guinea-pigs, however, inoculated from this same sheep 48 days later on, only one showed trypanosomes subsequently.

4. Details are given of three series of experiments where sheep inoculated with blood of guinea-pigs infected with *Trypanosoma gambiense* gave uniformly negative results; yet guinea-pigs inoculated with the blood of these sheep developed trypanosomes in their blood.

5. A sheep injected with blood of a guinea-pig infected with "Trypanosoma surrae"; result negative. A guinea-pig injected 18 days afterwards with the blood of this sheep showed trypanosomes 13 days subsequently.

ii. Kleine has some trenchant criticism of these experiments. He himself has failed to discover evidence of any invisible phase of piroplasma, anaplasma, and trypanosome.

A. A.

ESCOMEL (E.). **Les hémoparasitismes et les hémoporceurs de germes. Procédé rapide et sûr pour l'examen des leucocytes et des parasites dans le sang.**—*Bull. Soc. Path. Exot.* 1921. May 11. Vol. 14. No. 5. pp. 291-299.

For the study of leucocytes and of blood parasites the author recommends dissolving away the red cells by means of a solution of acetic acid (1 per cent.), and centrifugation of the residue.

A. A.

SÜTTERLIN (Theobald). **Ueber die Einwirkung chemischer Stoffe auf freilebende Protozoen.** [On the Action of Chemical Substances on Free-living Protozoa.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 4. pp. 99-114.

This paper gives at considerable length the results of a comparative study of the action of certain chemical substances upon free Protozoa. The substances used were tetrahydrooxymethoxydichinolichlorohydrat (in dilutions of 1-1,000 to 1-10,000), optochin (1-5,000 to 1-100,000), vuzin (1-5,000 to 1-100,000), and eucupin (1-5,000 to 1-100,000), and the Protozoa used were Amoeba, a Chlamydomonad flagellate near Polytomella, and two ciliate Infusoria, namely Colpoda and Paramoecium. The interesting point of the experiments made was that in solutions strong enough to have an appreciable effect within a limited time (24 hours), the flagellate was distinctly more sensitive and the two Ciliates were vastly more sensitive than the amoeba, which last, having no protective pellicle, might have been assumed to be the least sensitive. The remarkable sensitiveness of the Ciliates is attributed by the author to their possession of a mouth through which the hurtful chemicals would reach the innermost protoplasm more rapidly.

A. A.

BARRET (Harvey P.). **A Method for the Cultivation of Blastocystis.**—*Ann. Trop. Med. & Parasit.* 1921. July 16. Vol. 15. No. 2. pp. 113-116.

The culture medium here approved is 10 per cent. of human blood serum in a solution of 0.5 per cent. of common salt. The salt solution is sterilized in the autoclave and the serum added after inactivation for half an hour at 55° C. The medium is served in narrow test-tubes so as to give a column 100 mm. high, and for the initial operation a small portion of stools or of an emulsion of faeces in salt solution is placed in the bottom of the test-tube. The best growth occurs at the bottom of the medium; none occurs at the surface. If good growth has taken place in 24 hours a transplant can be made; cultures 72 hours' old are hardly ever good for this purpose.

In cultures, budding, as described by ALEXIEFF, and binary fission are the methods of multiplication observed. In hundreds of preparations the multiple division form of ALEXIEFF, pictured by WENYON and O'CONNOR has been seen on only two occasions. A great variation in size is exhibited. Since large vacuolate forms are commonly found in old cultures from which successful transfers cannot be made, these forms are inferred to be degenerate. No flagellate and no amoeboid forms were seen. The author concludes that Blastocystis is a definite zoological genus.

A. A.

NÖLLER (W.), KROSZ (K.) & ARNDT (A.). **Die Rhizopodenfauna des Pferdekotes und des Strassenstaubes in ihren Beziehungen zu Darmpassanten des Menschen.** [The Rhizopod Fauna of Horse Dung and Road Sweepings in its relation to Intestinal Parasites of Man.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 4. pp. 114-120.

The comparative study of the fauna of the faeces of animals is here vindicated, and the following forms observed by the authors are mentioned: several species of *Chlamydomphrys* found respectively in faeces of horse and pig, and also in road scrapings and manure; other testaceous amoebae—perhaps of the genus *Plagiophrys*—from horse dung; *Trinema enchelys* from horse and pig; *Gromia oviformis*, from horse and manure; a fifth kind of testacean—*Cochliopodium*—from horse, pig, mouse, and also from manure and road sweepings; *Sappinia diploidea* bred freely from road sweepings, also from pig, horse and mouse; *Dactylosphaerium* (?) *hartmannella* from road sweepings and straw refuse, and also from pig and pigeon; *Limax amoebae* of the Vahlkampfia type, from horse and from road sweepings.

A. A.

LAVERAN (A.) & FRANCHINI (G.). **Des hématozoaires du gecko et spécialement de *Herpetomonas tarentolae*. Procédé simple de culture des *Herpetomonas*.**—*Bull. Soc. Path. Exot.* 1921. June 8. Vol. 14. No. 6. pp. 323-326. With 1 text fig.

The gecko species *Tarentola mauritanica* in Algeria and Tunis is often infected with haematozoa: *Haemogregarina platydactyli* Billet, *Trypanosoma platydactyli* Catouillard, *Herpetomonas* sp. E. & E. Sergent and others, *Pirhemocytion tarentolae* Chatton and Blanc (endoglobular), *Trichomastix* sp. Chatton.

The authors examining 17 geckos of this species from Italy found trypanosomes in six and *Herpetomonas* in eight (in four individuals both species together), but did not find any of the other Protozoa above mentioned. *Herpetomonas*, as is known, grows well on simplified Novy medium; the authors find that it also thrives on peptonized broth with a few drops of rabbit-blood added.

A. A.

ZOTTA (G.). **Sur la culture en milieu N.N.N. du *Leptomonas pyrrhocoris*.**—*C. R. Soc. Biol.* 1921. May 7. Vol. 84. No. 16. pp. 822-824.

Leptomonas pyrrhocoris is an intestinal parasite of *Pyrrhocoris apterus* which passes through the walls of the intestine into the body

cavity and ultimately the salivary glands. It is easily cultivated in N.N.N. medium. In culture the flagellates sink to the bottom of the liquid of condensation, where they undergo modifications leading to a "barley-corn" stage. They then agglomerate in masses quite unlike rosettes and multiply actively. The young forms grow directly into acicular forms identical with those found in the blood of the bug.

A. A.

LAVERAN (A.) & FRANCHINI (G.). **Sur un *Herpetomonas* du loir.**—*Bull. Soc. Path. Exot.* 1921. May 11. Vol. 14. No. 5. pp. 278-280. With 1 text fig.

Description and figures of a *Herpetomonas* from a dormouse (*Myoxus glis*). The principal forms in blood, liver and spleen are leishmanias; in the blood and liver were also seen larger elongate non-flagellar forms, and a few typical flagellar *Herpetomonads*. Fleas were searched for in vain.

A. A.

REULING (Fritz). **Zur Morphologie von *Trichomonas vaginalis* Donnée.**—*Arch. f. Protistenk.* 1921. Vol. 42. No. 3. pp. 347-363. With 1 plate and 4 text figs.

Trichomonas vaginalis is described at a length of 15 pages. The material was obtained from the Heidelberg female clinic, the flagellate being found in 46 out of 250 cases complaining of abnormal discharges. The author notes that although it has long been accepted that *T. vaginalis* lives only in acid secretions, a frothy alkaline secretion containing *Micrococcus alcalescens gazogenes* is also particularly good soil, as was discovered by SCHRÖDER and LÖSER.

The author states with emphasis that the axostyle of *T. vaginalis* consists of four distinct fibrillae.

A. A.

PRINGAULT (E.). **Étude biologique de *Trichomonas intestinalis*.**—*Bull. Soc. Path. Exot.* 1920. Dec. 8. Vol. 13. No. 19. pp. 800-803.

The author describes the appearance and behaviour of this well-known flagellate, its susceptibility to antiseptics, etc., the method of laboratory culture, and the unsuccessful results of attempts at experimental infection of laboratory animals.

A. A.

CLAPIER (P.). **Note sur un flagellé de la famille des Tetramitidae, parasite fréquent des plaies à caractère phagédénique.**—*Bull. Soc. Path. Exot.* 1921. Apr. 13. Vol. 14. No. 4. pp. 208-211.

Description of a flagellate very closely related to *Tetramitus* and *Trichomonas*, found in phagaedenic sores and ulcers of various kinds and usually in association with spirochaetes and fusiform bacilli. Mention is also made of another flagellate having only two anterior flagella and devoid of an undulating membrane, found in suppurations of another kind.

These parasites are not accidental, but it is not necessary to attribute any pathogenic significance to them, is the author's conclusion.

A. A.

BOECK (William C.). *Chilomastix mesnili* and a Method for its Culture. — *Jl. Experim. Med.* 1921. Feb. 1. Vol. 33. No. 2. pp. 147-175. With 5 text figs.

A description full of detail, with excellent figures of free and encysted forms. The culture medium recommended is composed of one part of human serum and four parts of Locke's solution, with the addition of a small amount of dextrose. Locke's solution is made up as follows :— Sodium chloride 0.9 gm., calcium chloride 0.024 gm., potassium chloride 0.042 gm., sodium bicarbonate 0.02 gm., distilled water 100 cc. Add 0.25 gm. of dextrose ; sterilize ; add serum. A loop of faeces rich in flagellates is washed by stirring it in 2 cc. of warm sterile normal saline. Two drops of the wash are mixed with another lot of normal saline ; and two drops of this, again, are mixed with a third lot of saline. This is to get rid of excess of bacteria and faecal detritus. One or two drops of the washings are inoculated into a culture tube and incubated at 37° C. If the culture is successful flagellates are found in increasing numbers up to the fourth day afterwards, when they decrease and gradually disappear on the eighth or tenth day. In the author's cultures longitudinal binary fission was often observed ; multiple (quadripartite) fission also occurred ; paired flagellates were often seen during the first three days, but no exchange of nuclear substance was observed.

A. A.

REULING (F.) & RODENWALDT (E.). *Giardia-Lambli*?— *Arch. f. Protistenk.* 1921. Vol. 42. No. 3. pp. 337-346. With 2 text figs.

While agreeing that *Lambli* *intestinalis* and *Giardia agilis* are rightly included in one and the same genus, the authors think that *Lambli* might be distinguished as a subgenus.

In this case the subgenus *Lambli* would be defined as squat pear-shaped flagellates having the front part of the body cupped and the peristome kidney-shaped, the parabasal apparatus obliquely transverse and buckle-shaped, and moving with much action but little progress, like a rocking-horse [a rajah's horse would be a better description].

The cognate subgenus *Giardia* would be defined as slender flagellates with a head-like front and a deep transverse muzzle-like peristome, a longitudinally disposed club-like parabasal apparatus, and a serpentine mode of progression.

A. A.

BOECK (William C.). *Studies on Giardia microti*.— *Univ. California Public. Zool.* 1919. April 7. Vol. 19. No. 3. pp. 85-134. With 19 text figs. and 1 plate.

The following are the main conclusions of this sedulous study. *Giardia microti* has a cycle of encystment, with a maximal period of about seven days. Both in the free and in the encysted stages it multiplies both by binary and by octuple fission. Its parabasal bodies are acidophil, are of cytoplasmic origin, and are a reserve of glycogen for reproduction and for encystment. Its tenure is not affected by bismuth subnitrate and salicylate.

A. A.

RIBEIRO DA FONSECA (Olympio Oliveira). **Estudos sobre os Flagellados Parasitos. On Some Parasitic Flagellata.**—*Mem. Inst. Oswaldo Cruz.* 1920. Vol. 12. No. 1. [Portuguese version.] pp. 51-65. With 2 plates. [English translation.] pp. 48-59.

A well-illustrated paper in which the generic status of *Tetrachilomastix*, *Chilomitus* and *Waskia* are upheld and several of the author's species of parasitic flagellates are redescribed.

A. A.

KOFOID (Charles Atwood). **A Critical Review of the Nomenclature of Human Intestinal Flagellates, Cercomonas, Chilomastix, Trichomonas, Tetratrichomonas, and Giardia.**—Reprinted from *Univ. California Public. Zool.* 1920. June 28. Vol. 20. No. 6. pp. 145-168. With 9 text figs.

"1. *Cercomonas* is not as yet proved to be a human intestinal parasite, but coprophilic species of this genus occur in stale stools or in stool cultures. *Cercomonas* of clinical literature is probably *Chilomastix*. Flagellate stages of *Craigia* may have been reported as *Cercomonas*.

"2. *Cercomonas hominis*, Davaine (1860), was a complex of two species. His var. *A.*, named *Cercomonas davainei* by Moquin-Tandon (1860), is *Chilomastix*. The correct name for *Chilomastix* is not *C. mesnili* (Wenyon) but *C. davainei* (Moquin-Tandon).

"3. Davaine's *Cercomonas hominis* var. *B* is the human intestinal *Trichomonas*, the correct name of which is *T. hominis* (Davaine). *Cercomonas obliqua* Moquin-Tandon (1860), *Trichomonas intestinalis* Leuchart (1879), and *T. confusa* Stiles (1902) are synonyms of *T. hominis*.

"4. The type species of *Trichomonas* Donné (1837) has four free anterior flagella, hence *Tetratrichomonas* Parisi 1910 is a synonym of *Trichomonas*. *Trichomonas hominis* from the intestine and *T. buccalis* from the mouth also have four flagella.

"5. A flagellate of the mouth was first described by O. F. Müller (1773) as *Cercaria tenax*, but the description and figure are too meagre to permit re-identification. *Tetratrichomonas buccalis*, Goodey and Wellings (1917), should be transferred to *Trichomonas*.

"6. A new genus *Tritrichomonas* is established for trichomonad flagellates with three anterior free flagella with *T. augusta* Alexeieff, as type species.

"7. *Giardia enterica* (Grassi) 1881 has priority over *Lambliia intestinalis* (Lamb), Blanchard 1888, and over *Giardia lambliia* Stiles 1915."

A. A.

WENYON (C. M.). **Observations on the Intestinal Protozoa of Three Egyptian Lizards, with a Note on a Cell-Invading Fungus.**—*Parasitology.* 1920. Dec. Vol. 12. No. 4. pp. 350-365. With 2 plates and 2 text figs.

The precise and finely illustrated descriptions in this paper include a leptomonad flagellate found in packs in the cloaca and adjoining part of rectum—but not in any of the tissues, or even invading the cells of the local mucosa—of a *Chameleon vulgaris*; and a Bodo, a *Trichomonas*, a *Trichomastix*, as well as a large *Entamoeba* resembling *E. coli* and forming eight-nucleate cysts indistinguishable from those of *E. coli*, all from lizards.

In discussing the particular leptomonad the author recapitulates his views on the difficult subject of classification and nomenclature of the flagellates of this series, and he rehearses a system of grouping them which, though not professing much merit as a classification,

is undoubtedly a good enough provisional focalization. In this system the terms leptomonas, leishmania, crithidia, herpetomonas, and trypanosoma have, severally, an adjectival usage in reference to type of form, and a generic meaning in respect of type of life-history. Thus (1) leptomonads living exclusively in invertebrates, and producing leishmania forms that escape and are distributed in faeces, constitute the genus *Leptomonas*; (2) leptomonads existing in one phase as such (or occasionally as leishmania forms) in an invertebrate, and in another phase as leishmaniae in a vertebrate, form the genus *Leishmania*; (3) crithidians living exclusively in an invertebrate, and producing leishmania forms in the posterior part of the invertebrate's gut, form the genus *Crithidia*; (4) trypanosome forms (with concurrent intermediate forms of the lower types) living exclusively in invertebrates, constitute the genus *Herpetomonas*; and (5) trypanosomes (with concurrent intermediate forms of lower types) living both in invertebrates and vertebrates, constitute the genus *Trypanosoma*. The leptomonad of *Euphorbias* stands apart as *Phylomonas* Donovan.

In dealing with the Bodo the author describes its proliferation in the encysted stage very fully, and has occasion to discuss the significance of the term *Blastocystis*, giving a qualified adhesion to the view that under this name three distinct entities may have been confused, namely, true protozoan cysts, low vegetable organisms, and degenerate protozoa or even degenerated tissue-cells.

A. A.

PATTON (W. S.), LA FREN AIS (H. M.) & SUNDARA RAO. **Studies on the Flagellates of the Genera *Herpetomonas*, *Crithidia* and *Rhynchoidomonas*.**

No. 2. The Morphology and Life History of *Crithidia ctenocephali*, sp. nov., Parasitic in the Alimentary Tract of *Ctenocephalus canis*, Curtice [by Patton & Sundara Rao].

No. 3. The Morphology and Life History of *Rhynchoidomonas siphunculinae*, sp. nov., Parasitic in the Malpighian Tubes of *Siphunculina funicola*, de Meijere [by Patton].

No. 4. The Morphology and Life History of *Herpetomonas siphunculinae*, sp. nov., Parasitic in the Alimentary Tract of *Siphunculina funicola*, de Meijere [by Patton].

No. 5. The Morphology and Life History of *Herpetomonas pulicis*, sp. nov., Parasitic in the Alimentary Tract and Malpighian Tubes of *Pulex irritans*, L. [by Patton & Sundara Rao].

No. 6. Note on the Behaviour of *Herpetomonas pulicis*, Patton and Sundara Rao, *Crithidia ctenocephali*, Patton and Sundara Rao, and *Herpetomonas muscae domesticae*, Burnett, in the Bed Bug, *Cimex hemiptera*, Fabr. [by Patton, La Frenais & Sundara Rao].—*Indian Jl. Med. Res.* 1921. Apr. Vol. 8. No. 4. pp. 593-602. With 1 plate: 603-612. With 2 plates: 613-620. With 1 plate: 621-628. With 1 plate: 629-632.

No. 2.* *Crithidia ctenocephali* [a rather unfortunately chosen specific name] is parasitic in the alimentary tract of larva, pupa, and adult of *Ctenocephalus canis*. The larva is infected from the excreta

* No. 1 of this series was published in 1912 [see this *Bulletin* Vol. 1, p 1].

of the adult—its chosen food. The small round preflagellar stage, which simulates the round stage of the kala azar parasite, is found only in the larva. The flagellar stage is best seen in the stomach of the larva, the typical mature flagellate being elongate, and having the flagellum attached for a short distance to the anterior end. The end of the flagellar stage, which occurs in the larva, but also in the nymph and adult, is characterized by the formation of small spindle or oval flagellates. The post-flagellate stage—small round forms, sometimes with a tag of a flagellum—may be found in the hind-gut, though never in the rectum of the larva, but more usually occurs attached to the wall of the rectum of the adult.

The parasite has no connection with any trypanosome of the dog; nor can the dog be infected experimentally either by feeding or inoculation.

No. 3. *Rhynchoidomonas siphunculinae* is a natural parasite in the Malpighian tubules of the eye-fly (*Siphunculina funicola*); it has no connection with the *Herpetomonas* found in the gut of that insect. It is a typical flagellate, but distinct from either *Herpetomonas* or *Crithidia*; the adult is fusiform and has a short flagellum stretching from the vicinity of the blepharoplast (which is always behind the nucleus) to the anterior end but with no free continuation; in its life-history it exhibits the same phases as other insectan *Herpetomonas* and *Crithidia*; the fly is infected by ingesting the post-flagellate forms passed in the faeces of other individuals.

No. 4. *Herpetomonas siphunculinae* is a natural parasite in the alimentary canal of the eye-fly; it has not been seen in the Malpighian tubules. It develops normally in the alimentary tract of the larva; at a late stage of life it exhibits a characteristic trypanosome appearance, and might be mistaken for a trypanosome, and this stage was observed in flies nurtured in a test-tube and never fed on vertebrate blood. Owing to the habit of the eye-fly of feeding on sores, cuts, conjunctival secretion, etc., the author thinks that this its parasite may become pathogenic to man.

No. 5. *Herpetomonas pulicis* is a natural parasite of *Pulex irritans* and has been recorded in Europe, though according to the authors it has never been described. The larval flea becomes infected probably from the faeces of the adult; in the larva and pupa the parasite lives in the stomach, but in the adult flea it inhabits the Malpighian tubules in the flagellar stage and the hind gut and rectum in the post-flagellar stage. The authors, who accept the view that human leishmaniasis has its antecedents in insect herpetomoniasis, regard this flagellate of the human flea with misgiving.

In all the foregoing papers the respective flagellates are copiously figured in all their stages.

No. 6. In a batch of bugs (*Cimex hemiptera*=*rotundatus*) fed on culture of *Herpetomonas pulicis* individuals examined up to 48 hours afterwards had plenty of flagellates in the mid and hind gut, and a few were found in the hind gut and rectum of an individual examined on the seventh day; but after that none could be detected in any part of the gut of any individuals examined; by culturing the gut, however, on successive days after the feed, the existence of flagellates could be demonstrated even on the 37th day after the original infective feed. The significance of these observations for experimental work is obvious.

HOARE (Cecil A.). **Some Observations and Experiments on Insect Flagellates, with Special Reference to Artificial Infection of Vertebrates.** (A Report to the Department of Scientific and Industrial Research.)—*Parasitology*. 1921. Mar. Vol. 13. No. 1. pp. 67-85.

The paper starts with a review of the history of the crithidia (*C. melophagia*) of the Ked (*Melophagus ovinus*), rightly conjectured by Woodcock to be the praeter-vertebrate form of the trypanosome (*T. melophagium*) of the sheep upon which the Ked is parasitic, but afterwards declared by several authors to be a specific parasite of the Ked itself and transmitted from one generation of Keds to another as a heritage. The author was engaged in experiments which did not tend to confirm those authors' statements when he became acquainted with papers by NÖLLER (*Arch. f. Schiffs- u. Trop.-Hyg.* 1917 and 1919; and *Deut. Tierärztl. Woch.* 1920) containing the experimental proof that WOODCOCK's conjecture was right. This led him on to investigate the work of certain authors, notably LAVERAN and FRANCHINI, and FANTHAM and PORTER, who, from experiments with various species of flagellates parasitic in the gut of insects, have come to the conclusion that those flagellates—particularly those of insects associated with vertebrates—are definitely pathogenic to vertebrates, FANTHAM, as is well known, having embodied his conclusions in the formula that Leishmanias of vertebrates are arthropod-derived herpetomonias.

The author has repeated some of these experiments. He has inoculated mice—a total of 15 experiments—with the crithidia of the Ked, with the herpetomonas of the blowfly, and with the herpetomonas of the water-scorpion; he has fed and inoculated sticklebacks and newts, and has inoculated frogs, with the herpetomonas of the water-scorpion—a total of 35 experiments: and he presents here the records and results of his experiments, each and all. In no case, whether he proceeded by microscopical investigation or by cultural methods, did he find any trace of infection in the animals fed or inoculated.

The author does not state that his experiments disprove the conclusions of the other observers, but only that the results of his experiments are contrary to theirs, and therefore show that the subject requires further study.

He does, however, make some damaging criticisms of some of the incongruous experiments. For instance, FRANCHINI and MANTOVANI stated that blood cultures from a rat inoculated with *Herpetomonas muscaedomesticae* produced only "anaplasma" bodies, and that these when re-inoculated into a mouse gave rise to *Leishmania* forms; now whatever these questionable anaplasma forms may be, there are no grounds for connecting them with flagellates. Again, in the experiments of LAVERAN and his collaborators references to *Leishmania* forms with a single nucleus are frequent. Furthermore, in these observers' experiments the inoculation of mice with *Crithidia melophagia*—proved by NÖLLER to be the antecedent form of the trypanosome of the sheep—produced *Leishmanias* and not trypanosomes in the mice.

The author has some significant observations on the vitality of some of the insect flagellates. Flagellates can remain alive in the intestine of fish for 5 hours, or even for 18 hours, and when injected into the

peritoneal cavity, for 4 days. Crithidia in the contents of the Ked's gut diluted with saline, lived for a day at a temperature of 30° C., and for 7 days at room-temperature. Herpetomonas in the contents of the water-scorpion's gut diluted with saline, or with alkaline nutritive bouillon, lived for 5 days at room-temperature. No multiplication was observed in these cases.

A. A.

MCCULLOCH (Irene). **A Comparison of the Life-Cycle of Crithidia with that of Trypanosoma in the Invertebrate Host.**—*Univ. California Public. Zool.* 1919. Oct. 4. Vol. 19. No. 4. pp. 135-190. With 3 text figs. and 5 plates.

The purpose of this paper is to compare the structure and life-cycle of the Crithidia of a plant-feeding bug with the crithidia stages of a Trypanosoma in the invertebrate host: *Crithidia curyophthalmi*, parasitic in the gut of the lupin bug, *Euryophthalmus convivus*, is compared with the crithidia phases of *Trypanosoma lewisi* in the rat-flea, as described by MINCHIN and THOMSON, though the comparison is somewhat complicated by the fact that in the bug the stomach portion of the midgut consists of three distinct chambers.

The lupin bug is infected not from the lupin, in the sap of which nothing suggesting any known phase of a flagellate can be detected, but from spores passed in infective bug-faeces. On reaching the anterior chamber or "crop," the spores rapidly develop into crithidias, and the mature crithidias may either (a) be carried onwards through the stomach; or (b) may undergo multiple endogenous intracellular fission in the "crop"-wall, much as *T. lewisi* does in the epithelial cells of the flea's stomach; or (c) may undergo multiple endogenous extracellular fission in the crop, giving rise by degeneration to something which suggests the "latent bodies" described by MOORE and BREINL in the life-cycle of *T. gambiense*; or (d) may multiply by ordinary binary fission.

Owing to the aforesaid complexity of the bug's stomach, it is not easy to say where exactly the stomach phase ends and the rectal phase begins; but in the third or pyloric chamber, three distinct types of the flagellate are definitely established, namely (a) free forms, which may be either slender, elongate crithidias, or small, non-flagellar ovoids, having a superficial resemblance to the initial infective spores, (b) attached squat forms, and (c) infective spores.

In the rectum only the infective spores are found; they are small, oval, non-flagellar forms with a thick periplast, a nucleus, a parabasal body, and possibly a faint nuclear rhizoplast.

Degenerative forms of all kinds are to be found in the pyloric expansion of the stomach, but they are not seen in the rectum.

The author concludes that there are more parallel stages and phases in the life-cycle of *Crithidia euryophthalmi* and *T. lewisi* than are to be met with in comparing any trypanosome and herpetomonad (or leptomonad) known, and therefore, that the evolution of a trypanosome has probably been from a crithidian rather than from a herpetomonad (or leptomonad)

A. A.

- i. LAVERAN (A.) & FRANCHINI (G.). **Contribution à l'étude de la flagellose des euphorbes.**—*Bull. Soc. Path. Exot.* 1920. Dec. 8. Vol. 13. No. 10. pp. 796-800.
- ii. SERGENT (Étienne). **Existence de *Leptomonas davidi* dans le latex d'euphorbiacées d'Algérie (*E. péploïdes*).**—*Arch. Institut Pasteur de l'Afrique du Nord.* 1921. Mar. Vol. 1 No. 1. p. 58.
- iii. ZOTTA (G.). **Un leptomonas du type *L. davidi* Lat. chez des Euphorbes de France.**—*C. R. Soc. Biol.* 1921. July 2. Vol. 85. No. 24. pp. 226-228.

i. At Bologna, in certain species of Euphorbia, the authors have found, besides the typical Flagellate, some non-flagellate spherical and oval forms, both uninucleate and binucleate.

The authors have successfully inoculated healthy Euphorbias of two species with pure cultures of *Herpetomonas ctenocephali* var. *chattoni*.

They have also inoculated white mice, peritoneally, with the latex of naturally infected *Euphorbia nereifolia*, and in two cases where the animal survived the immediate effects, leishmaniform parasites were subsequently found in the blood.

ii. Flagellates have been searched for in several hundred individuals of several species of Euphorbia, in Algeria, during some years and only in one case with success, *Leptomonas davidi* having been found in a *Euphorbia péploïdes*.

iii. A record of the occurrence of a *Leptomonas* corresponding "assez exactement" with *L. davidi* in *Euphorbia esula* var. *mosana* and *E. helioscopia* at Pouligné.

A. A.

- NOC (F.). **Nouveau cas de Coccidiose intestinale humaine à *Isospora*.**—*Bull. Soc. Path. Exot.* 1920. Dec. 8. Vol. 13. No. 10. pp. 785-789.

Case of a French colonial soldier four years a prisoner under the most insanitary conditions in German camps, where sometimes he had to fight for his food with rats. At times, in common with fellow prisoners, some of whom died thereof, he suffered from diarrhoea. When under treatment, after his release, for recurring attacks of a liquid, blackish, foetid diarrhoea, cysts of *Lambia* and oöcysts of a Coccidiid were found in the stools.

The oöcysts were 22-23 μ in the major, 10-16 μ in the minor diameter. Under ordinary laboratory treatment they increased in size and ripened into sporocysts containing two spores each holding 4 sporozoites.

The patient was treated with novarsenobenzol intravenously, and with cachets of thymol, and though the diarrhoea and the oöcysts persisted for some time during treatment they ultimately disappeared. The author is not yet satisfied that the disappearance is final. He compares the oöcysts with others that have been described from human stools.

A. A.

- SNIJERS (E. P.). **On the Cysts of a Hitherto Undescribed Species of *Eimeria* in Human Stools.**—*Parasitology.* 1920. Dec. Vol. 12. No. 4. pp. 427-432. With 1 text fig.

The author describes, figures, and discusses the oöcysts, and their contents, of an undescribed Coccidium found in Sumatra in the stool

of a patient who had been under treatment for chronic amoebic dysentery, and in whose stools the usual forms of *Entamoeba histolytica* had been found proper to the relapses and the dormant intervals respectively.

Comparing the oöcysts with those of *Eimeria oxyspora* and *E. wenyoni*, he remarks, as the most obvious difference from the former, the absence of "crystalline bodies" in the sporozoites; and, from the latter, the larger size of the oöcyst, and the slenderer and more sharply pointed spores.

A. A.

DOBELL (Clifford). **A Note on the New Species of *Eimeria* found in Man by Dr. E. P. Snijders.**—*Parasitology*. 1920. Dec. Vol. 12. No. 4. pp. 433-436.

After remounting and re-examining some of Dr. SNIJDERS' material this author pronounces it to be a new species which he names *Eimeria snijdersi*, and characterizes as follows:—

"Oöcyst colourless, spherical, 40-48 μ in diameter. Spores fusiform, equally pointed at both ends; length 20-25 μ , width in middle 7-8 μ . Oöcystic residue small, granular. Sporocystic residues in the form of one or two small refractile spheres. No 'crystalline bodies'—like those of *E. oxyspora*—visible at the posterior end of the sporozoites."

The author mentions incidentally that of the two coccidia of man reported since the publication of his own "Revision," one, recorded by LOCKHART-MUMMERY and GABRIEL, is not a Coccidium or even a Protozoon at all; and the other, reported by HUETTER as occurring in a rectal tumour, is probably not a case of coccidiosis.

A. A.

PHISALIX (Marie). **Coccidiose des serpents.**—*Bull. Soc. Path. Exot.* 1921. Feb. 9. Vol. 14. No. 2. pp. 82-84.

Notes of cysts of Coccidia in the bile-ducts and gall-bladder of several species of snakes.

A. A.

SERGEANT (Edm.) & ESPÉRANDIEU (G.). **Études sur les piroplasmoses et les jaunisses en Algérie. viii. À propos d'un accès suraigu de piroplasmose bovine à petites formes annulaires extrêmement nombreuses.**—*Bull. Soc. Path. Exot.* 1920. Dec. 8. Vol. 13. No. 10. pp. 779-783. With 2 text figs.

A case of bovine piroplasmosis difficult for specific identification. The great majority of the parasites were small rings; there were also some rods, both vacuolated and non-vacuolated, and a few anaplasma forms; but not any pear-forms, or paired forms, or cross-forms.

A. A.

SERGEANT (Edm.). **Étude morphologique du *Piroplasma* (*Gonderia*) *mutans* du boeuf.**—*Ann. Inst. Pasteur*. 1921. Mar. Vol. 35. No. 3. pp. 193-203. With 1 coloured plate.

The author has made a detailed study of 1369 piroplasms answering to the characters of *Piroplasma* (*Gonderia*) *mutans* from six Algerian

bovines—three in good health and three differently infected—and the following is the statement of his conclusions:—

In observed cases a slight infection—an average of 5·9 up to a maximum of 20 red corpuscles in 1,000 infected—is consistent with an excellent state of health.

P. mutans exists in two principal forms, namely (1) annular (round or elliptical) with a large vacuole, and (2) bacilliform, both of which exhibit schizogony. These two forms, with all their varieties, were found in all six bovines but in very different proportions: in two animals the rings constituted 80 per cent., in the other four only 25 per cent. In their schizogony the annular forms end in a quaternary (sometimes ternary?) division: the young bacilliform elements show in 40·8 per cent. of cases a binary division.

Furthermore *P. mutans* exhibits coarse bacilliform elements with round or oval nucleus, having the characters of gametes

Among 229,800 red corpuscles examined in the investigation of the 1,369 piroplasms, 15 forms answering to the definition of *Anaplasma* or equally to that of Jolly bodies were seen.

A. A.

DU TOIT (P. J.). **Experimentelle Studien ueber die Pferdepiroplasmose** [Experimental Studies on Piroplasmosis of the Horse].—*Arch. f. Schiffs- u. Trop.-Hyg.* 1919. Vol. 23. No. 16. pp. 359–368. With 1 text fig.

The author failed to transmit the infection of *Piroplasma caballi* by means of *Ixodes ricinus*, but succeeded with *Dermatocentor reticulatus*. The latter species can be infected as a larva and becoming infective as a nymph can retain the infection and carry it on to the adult stage.

A. A.

KUDO (R.). **Microsporidia Parasitic in Copepods.**—*Jl. Parasit.* 1921. Mar. Vol. 7. No. 3. pp. 137–143. With 2 text-figs.

Description and figures of *Nosema cyclopis*, parasitic in the fat body and perhaps in the reproductive organs of *Cyclops fuscus*; and *N. infirmum*, parasitic in the fat body, reproductive organs and muscles of *Cyclops albidus*; both being new species seemingly fatal to their hosts. Descriptions of six other recorded species of Microsporidia parasitic in Copepods are also included in the paper, and a useful list of references to the subject is appended.

A. A.

FRASER (A. D.). **Notes on Blood-Sucking Flies in North Russia during the Summer of 1919.**—*Bull. Entom. Res.* 1920. Dec. Vol. 11. Pt. 3. pp. 195–198.

The species observed include 4 of Culicoides, 6 of Simulium, 5 of Chrysops, 2 of Haematopota, and 9 of Tabanus, besides *Anopheles maculipennis* and 3 other Culicinae, and *Stomoxys calcitrans*. Though some of them were extremely troublesome they were not proved to have any specific pathogenic importance to men or domestic animals.

A. A.

MACGREGOR (Malcolm E.). **A New Type of Entomological Killing-Bottle.**—*Bull. Entom. Res.* 1920. Dec. Vol. 11. Pt. 3. pp. 283-285. With 1 text-fig.

The author confirms the many objections to potassium cyanide, and figures and describes in necessary detail an ingenious killing-bottle containing a small reservoir of chloroform.

A. A.

NIGERIA. **Annual Medical and Sanitary Report of the Northern Provinces, Nigeria, for the Year ending 31st December, 1918.** [JOHNSON (W. B.)]. pp. 48-50. With 3 maps.

In 1914 an entomological survey of the Kaduna district of Northern Nigeria, by Dr. J. E. L. JOHNSTON, revealed only one specimen of *Glossina tachinoides* (on the Kaduna R.) and two specimens of *G. palpalis* (on the Tubo R.). The author when shooting in the same district between May 1917 and May 1918 found *G. tachinoides* to be common and widely distributed along the Kaduna during the dry season, and along all its tributaries and also along those of the Tubo during the rains, and he also found *G. palpalis* in many places.

In view of cases of sleeping sickness having occurred at Kaduna capital the author considers this revival and diffusion of *Glossina* to be a matter of importance.

A. A.

TAKATSUKI (Akira). **Die echte Wirkungsweise des Petroleums auf die Insekten.** [The Real Action of Petroleum on Mosquito Larvae.]—*Kyoto Igaku Zasshi*. 1920. Sept. Vol. 17. No. 9. pp. 1051-1057. (37-43.) [In Japanese. German Autoreferat. pp. 67-70].

The author from his experiments confirms a very widely accepted conclusion that petroleum acts on mosquito larvae not mechanically but as a poison. He, however, goes further, and states that it has a selective effect on the epithelium of the air-tubes.

A. A.

ROUBAUD (E.). **Les diptères et la pathologie exotique.**—*Bull. Soc. Path. Exot.* 1921. Feb. 9. Vol. 14. No. 2. pp. 58-65.

An interesting lecture on the general aspects of the subject ; nothing technical or novel.

A. A.

CHANAL (Louis). **Rôle pathogène des moustiques en pathologie humaine et comparée. Répertoire des espèces pathogènes et des parasites qu'elles transmettent.**—91 pp. 1921. Paris: Vigot Frères, Éditeurs, 23, rue de l'École-de-Médecine. [Price not stated.]

This is a valuable and useful compilation, and will undoubtedly be much appreciated, including as it does exact references, systematically arranged and specifically assorted, to what has been recorded from observation and experiment of the pathogenic activities of the Culicidae, together with a comprehensive bibliography. There are also

some judicious remarks on the question as to what constitutes a dangerous species from the malaria standpoint. There may be one or two quite unimportant and innocuous deviations from a rigid taxonomy.

A. A.

MARTINI (E.). **Ueber Stechmücken- und Kriebelmückenzucht.** [The Artificial Breeding of Mosquitoes and Simuliids.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 4. pp. 120-121.

Some difficulties in breeding mosquitos and other midges are here referred to [Everyone who has bred *Anopheles* from the egg knows how difficult it is to keep the larvae supplied constantly with the right food] and the author here recommends a substance called Piscidin. (Gustav Haberle, Hamburg 23, Börnestrasse 36) as particularly good nutriment. It is rubbed to a powder and sprinkled thinly on the surface of the water, and it does not sink quickly.

A. A.

PURDY (W. C.). **Biological Investigation of California Rice Fields Relative to Mosquito Breeding. Progress Report.**—*Public Health Rep.* 1920. Oct. 29. Vol. 35. No. 44. pp. 2556-2570. With 6 charts in text.

The principal conclusions of this careful survey of a Californian rice ranch and its vicinity are (1) that mosquitoes (both *Anopheles* and *Culex*) breed almost entirely in the natural puddles and ditches of the area and hardly at all in the rice fields, though there is no appreciable difference in quantity and quality of food supply, and though natural enemies are most numerous where mosquito larvae are most abundant and fewest where mosquito larvae are practically absent; (2) that the most striking difference between the natural waters and the rice fields is the existence in the latter of a heavy growth of blue-green algae and of surface films composed of minute algae (many diatoms), protozoa, bacteria, etc., all matted together by a yellowish-brown flaky stuff of unknown origin; (3) that *Anopheles occidentalis* is present throughout the year, though most abundant in August and September—no males were, however, found from the middle of November to the end of April.

A. A.

LAMBORN (W. A.). **The Habits of a Dipteran Predaceous on Mosquitos in Nyasaland.**—*Bull. Entom. Res.* 1920. Dec Vol. 11. Pt. 3. pp. 279-281.

The writer observed the Anthomyid fly *Lispa* preying on larvae, pupae, and emergent adults of mosquitoes. He observed also four other species of Diptera suspiciously engaged on the water, one of them unsuccessfully assaulting mosquito larvae. [The late Dr. J. M. ATKINSON, of Hongkong, sent to the London School of Tropical Medicine many years ago specimens of *Lispa sinensis* and of a Dolichopodid fly observed by him to prey upon mosquito larvae.]

The writer also observed mosquito larvae attacking with mortal effect a Syrphid larva.

A. A.

DALZIEL (J. M.). **Crab-Holes, Trees, and other Mosquito Sources in Lagos.**—*Bull. Entom. Res.* 1920. Dec. Vol. 11. Pt. 3. pp. 247-270.

Among the 14 species found to breed in crab-holes are *Stegomyia fasciata* and *Anopheles costalis*; among the six species in tree-holes, *S. fasciata*; among the twelve species in wells, *S. fasciata*, *A. costalis*, and *Culex fatigans*; among the five species in agbo pots, *S. fasciata*, and *A. costalis*; among the six species in roof-gutters, *S. fasciata*, *A. costalis* and *A. mauritanus*; among the eight species in domestic waters, *S. fasciata*, *C. fatigans*, *A. costalis*, and *A. mauritanus*.

Between May, 1914, and August, 1918, 47 species of Culicidae have come to notice in Lagos Municipal area, including *A. costalis*, *A. funestus*, *A. mauritanus*, *A. obscurus*, *A. nili*, *C. fatigans*, *Mansonia africanus* and *uniformis*, *S. fasciata*, and three species of Uranotaenia.

A. A.

BLACKLOCK (B.) & CARTER (H. F.). **Observations on Mosquitoes in the Isle of Man.**—*Ann. Trop. Med. & Parasit.* 1921. Apr. 27. Vol. 15. No. 1. pp. 73-90. With 5 plates and 1 map.

The survey here recorded was made in part of November and December and was confined to places easily reached by rail and tramway. The species found were *Anopheles bifurcatus* (larvae, abundant and widely distributed), *A. maculipennis* (hibernating females, not so numerous as was expected), *A. plumbeus* (larvae, not associated with *Ochlerotatus geniculatus*), *Culex pipiens* (females), *Theobaldia annulata* (larvae, pupae, and adults), *Culicella morsitans* (larvae of various sizes), and *Culicella fumipennis* (larvae, only in one locality).

A. A.

EDWARDS (F. W.). **Mosquito Notes. ii.**—*Bull. Entom. Res.* 1921. June. Vol. 12. Pt. 1. pp. 69-80.

Among other things in this paper are descriptions of two new species of *Anopheles* :—

(1) *A. flaviceps*, from the Anglo-Egyptian Sudan; "apparently most nearly related to *A. turkhudi*, Liston, and *A. hispaniola*, Theo. (which may be a local form of *A. turkhudi*), but differing in the paler colour of the integument, especially of the head, almost obsolete frontal tuft, more numerous prosternal hairs, more shining mesonotum, and somewhat less conspicuous wing-markings"; there are also differences of detail in the male hypopygium.

(2) *A. amictus* from Queensland, Australia, differing from *A. annulipes*, Walker, in the following particulars—the proboscis entirely dark-scaled in both sexes; the antennae of the female shorter and stouter, the last ten joints all being of about the same length and thickness; the abdomen rather densely clothed with broad flat scales on all segments except the first, the dorsal scales mostly yellowish but with a patch of dark in the middle of segments 4-6, the ventral scales mostly whitish; the white spots on the legs larger, the posterior surface of the front tibiae being almost entirely white; and the first longitudinal vein with 14-18 black spots, all small. The author states that this proposed new species is very close akin to *A. annulipes* and that "some specimens show intergradation in some respects."

The author also draws attention to a new variety, *hackeri*, of *A. leucosphyrus*, in which, in the female, the proboscis is longer than the palpi by an amount equal to the length of the two terminal palpal segments, and the white rings of the palpi are very narrow. He also discusses *A. punctulatus* and its varieties *moluccensis* and *tessellatus*.

A. A.

BALFOUR (Andrew). **Mosquito Breeding in Saline Waters.**—*Bull. Entom. Res.* 1921. June. Vol. 12. Pt. 1. pp. 29-34.

A useful list of references and commentary on the breeding of mosquitoes in salt and brackish waters. It deals chiefly with species that are known to carry disease, and its purpose is practical.

A. A.

GRIFFITTS (T. H. D.). **Anopheles and Sea Water, with Observations on the Influence of Salinity on the Development of American Species.**—*Public Health Rep.* 1921. May 6. Vol. 36. No. 18. pp. 990-1000.

This paper contains numerous references to the subject of the breeding of various species of *Anopheles* not only in sea water, but also in sea water which has become concentrated to more than half its bulk by evaporation. It also contains a series of detailed observations on the tolerance of sea water of three American species of *Anopheles*. One of these, *A. crucians*, was found to propagate in sea water diluted to a maximum salinity of 10,088, or slightly more than 50 per cent. average sea water: larvae which had begun their development in brackish water continued it when transferred to sea water. *A. quadrimaculatus* was not found breeding in large numbers in water of salinity over 10,003; larvae transferred from fresh water to sea water of salinity 10,160 were all killed within 12 hours. *A. punctipennis* was not found in salt or brackish waters: larva put into sea water all died within seven hours.

A. A.

LAMBORN (W. A.). **The Nature and Function of the Caudal Tufts of Malayan Anopheline Larvae.**—*Bull. Entom. Res.* 1921. June. Vol. 12. Pt. 1. pp. 91-97. With 3 text figs.

The author figures and describes the anchoring hook-like endings of the hairs of the dorsal tail-tufts of certain *Anopheles* larvae, particularly of those that live in running streams, and draws attention to their function. He also describes and figures a pair of hooks terminating the paddles of the corresponding pupae.

It is strange that these interesting adaptations should have been overlooked hitherto.

A. A.

WESENBERG-LUND (C.). **Contributions to the Biology of the Danish Culicidae.**—*Mém. Acad. R. Sciences et Lettres Danemark.* (Sect. des Sci.) 1920-1921. 8th Ser. Vol. 7. No. 1. pp. 1-210. With 21 plates and 19 text-figs.

This is a particularly full and scrutinous account, occupying over 200 pages and illustrated by 21 plates, of the *Culicidae* of Denmark.

One chapter, devoted to *Anopheles* and malaria in that country, is of great general interest.

A. plumbeus seems to be a rare species. *A. bifurcatus* is found mainly in forests, but often flies into bedrooms after eight o'clock at night, and inflicts a painful bite: in dull muggy weather it may be seen on the wing in the middle of the day, its powers of flight being good. When the author began his investigations he thought *A. maculipennis* was a rare species, and he was therefore much astonished when he found it to be incredibly common. In the open it is rare, since it spends its adult life, except when engaged in the actual processes of reproduction, in outhouses, stables, cow-sheds, etc., feeding entirely upon pigs, cattle, and horses, and not upon man. The author discusses the bearing of these facts upon the malaria problem.

Why has malaria, which up to three generations ago was common in Denmark, now disappeared, though in every farmstead *Anopheles maculipennis* is still abundant? The author considers this question at great length and comes to the conclusion that, whatever may be the influence of contributory factors, the main causation is the change in the character of Danish farming. In the old days of arable crops and open pastures it would frequently happen that man was a more easily procurable prey than cattle for *Anopheles maculipennis*. But in the modern system of co-operative dairy-farming the domestic animals are concentrated in good permanent shelters where the insect can and does concentrate on them. Man, therefore, who is only a *pis aller* for *A. maculipennis*, escapes attack; and thus the malaria chain has been broken by a change of circumstances, highly agreeable to the insect's tastes, which have brought about a change in the insect's habits.

The author thus, independently, endorses the views of E. ROUBAUD (see this *Bulletin*, Vol. 16, p. 103) regarding the protective value of domestic animals, against malaria, in Western Europe.

A. A.

SWELLENGREBEL (N. H.) & SWELLENGREBEL DE GRAAF (J. M. H.). [In Dutch and English.] **Onderzoekingen over de verspreiding der Anophelinen in verband met die der malaria in eenige stations van Java en Sumatra.**—**Researches on the Anophelines at some Stations of Java and Sumatra in Connection with the Occurrence of Malaria.**—*Meded. Burgerlijk. Geneesk. Dienst. in Nederl.-Indië.* 1919. Deel. 10 pp. 1-67. With 4 folding maps and 1 chart in text

An interesting abstract of an official report on a systematic survey of several rural districts, townships, and groups of villages, in which the intensity of the local malaria (as estimated by spleen examination) is in each case considered in relation to local topography and specific distribution of *Anopheles* and their breeding-places. Of all the species of *Anopheles* discovered or reasonably inferred to be dangerous *A. ludlowi* is the one most frequently mentioned. In some places this species disappears in October-November; in certain places the distance between the haunt of the adult and possible breeding-places was not less than 1.3 to 1.6 kilometres. In their miscellaneous observations on the bionomy of *Anopheles* the authors note the tendency of rain, particularly of rain at night, to drive certain species (e.g., *sinensis*, *fuliginosus*, and also *maculatus*) into houses.

A. A.

- i. DE MELLO (Froilano) & BRÁS DE SÁ (L. J.). [In Portuguese and French]. Contribuição para o estudo da fauna anofelina da Índia Portuguesa.—Contribution à l'étude de la faune anophéline de l'Inde Potugaise [sic].—*Arquivos Indo-Portugueses de Med. e Historia Nat.* Nova Goa. 1921. Vol. 1. pp. 1-40. With 4 plates.
- ii. LÉGER (Louis). Moustiques de Camargne. Un Anophéline nouveau pour la faune française, le *Myzorhynchus sinensis*, Wied.—*C. R. Soc. Biol.* 1920. Dec. 18. Vol. 83. No. 37. pp. 1609-1610.
- iii. PENNA (Belisario). Ligeiras observações sobre os habitos dos dois mosquitos predominantes no Rio de Janeiro.—o "*Stegomyia fasciata*" e o "*Culex fatigans*."—*Brazil Medico.* 1921. Feb. 5. Year 35. Vol. 1. No. 6. pp. 76-81.
- iv. SALOM (C. E.). Sobre algunos dípteros y otros insectos de la Guayana Venezolana.—*Gac. Med. de Ciudad-Bolivar.* 1921. Mar. Vol. 7. No. 80. pp. 121-126.

i. A very good descriptive account, with tabulated synopsis and illustrations of specific characters, of the Anophelines of Portuguese-India: contains nothing new or original.

ii. The author notes the occurrence, in abundance, of *Anopheles* (*Myzorhynchus*) *sinensis*, in the marshes of Camargue, situated east of the Rhône.

iii. A long account of these two common circumtropical species, but not containing anything novel.

iv. A hazy sketch introducing by their vernacular names some of the orders of insects and arachnids of local repute.

A. A.

SWELLENGREBEL (N. H.). [In Dutch and English.] *Myiobium myzomyiae*, een parasitische Haplosporidie uit het darmkanaal van eenige Anophelinen.—*Myiobium myzomyiae*, a Parasitic Haplosporidium found in the Intestinal Tract of some Anophelinae.—*Meded. Burgerlijk. Geneesk. Dienst. in Nederl.-Indië.* 1919. Pt. 10. pp. 68-72. With 5 figs.

Description and figures of a Haplosporidian parasite found in the inner wall of 3·3 per cent. of females of *Anopheles indefinitus* examined at Modjowarno. [A parasite of similar appearance has lately been observed by Colonel C. GILL and the reviewer in some specimens of *Anopheles maculipennis* examined for evidence of malarial infection.]

A. A.

FLU (P. C.). [In Dutch and English.] **Onderzoek naar den levensduur van *Stegomyia fasciata* bij lage temperaturen.**—**Tests re the Period in which *Stegomyia fasciata* can live at Low Temperatures.**—*Meded. Geneesk. Lab. Weltevreden.* 1920. 3rd Series A. Nos. 10, 11 and 12. pp. 494-501.

The author being questioned as to the possibility of infected *Stegomyia* being disseminated with bananas, etc., in the refrigerators of ships, undertook a series of experiments to test the resistance of these insects to cold. The experiments are described, and the conclusions are that in refrigerators at a temperature of 6° C. or lower, *S. fasciata* perishes without doubt after 24 hours; that at temperatures varying between 7° and 10° C. the insects are benumbed immediately, but are not actually dead until at least four days afterwards;* and that in a ship's

refrigerator if the temperature be constantly above 6° C., and the voyage take less than 6 days, "there is a small chance" ("hoevel kleiner kans bestaat") of the insects being brought from place to place alive.

A. A.

HILL (G. F.). **Notes on some Unusual Breeding-Places of *Stegomyia fasciata*, Fabr., in Australia.**—*Ann. Trop. Med. & Parasit.* 1921. Apr. 27. Vol. 15. No. 1. pp. 91–92. With 1 plate.

Numerous larvae and pupae of *S. fasciata* and *Ochlerotatus notoscriptus* were found in a tin lying in dense scrub 600 yards distant from any dwelling; and again larvae of three species, including *S. fasciata*, were found in a rot-hole in a Poinciana tree.

A. A.

LARROUSSE (Fernand). **Étude systématique et médicale des phlébotomes.**—106 pp. With 20 text figs. 1921. Paris: Vigot Frères, Editeurs, rue de l'École-de-Médecine 23. [Price not stated.]

This very complete study of the genus *Phlebotomus* consists of three parts, the first dealing with natural affinities, anatomy, biology and bionomy, and with methods of observation, preservation, etc.; the second being taxonomic and specifically descriptive; and the third being occupied with a discussion of the pathogenic implications of these insects; in conclusion, there is an exhaustive bibliography filling ten pages of small print.

To give an abstract of this extremely valuable piece of work is not necessary, since its conspicuous merit consists not in any novelty of fact, but in comprehensiveness of statement and lucidity of treatment; it is, in short, a small encyclopaedia, which every one must become possessed of who requires to study the genus *Phlebotomus*, whether from the entomological or the medical standpoint.

In the systematic part the species are consorted geographically, and for each great geographical region they are synoptically tabulated and individually described. The synoptic tables include only the male sex; but, as the author says, the original descriptions of the different species of *Phlebotomus* do not follow a uniform plan, so that it is difficult to compare them when they refer only to the female, in which sex the specific differences are not so imposing as they are in the male.

A. A.

FRANÇA (Carlos) & PARROT (L.). **Introduction à l'étude systématique des Diptères du genre *Phlebotomus*.**—*Bull. Soc. Path. Exot.* 1920. Oct. 13. Vol. 13. No. 8. pp. 695–708. With 4 text figs.

The authors in the course of a dissertation on the genus propose to distribute the species of *Phlebotomus* in two subgenera characterised as follows:—(i) Subgenus *Phlebotomus*: Distal segment of upper claspers of male nearly as long as the proximal segment; middle claspers with a digitiform and fimbriated appendage; lower claspers short and armed. (ii) Subgenus *Sergentomyia*, França; Distal segment of upper claspers of male decidedly shorter than the proximal segment: middle claspers without fimbriated and digitiform appendage: lower claspers long and unarmed.

They furthermore hint at a third subgenus, *Neophlebotomus*, for *P. malabaricus*, Annandale, conforming to *Sergentomyia*, except in having spines on the lower claspers.

A bibliography, not professing to be complete, is appended.

A. A.

FRANÇA (Carlos). **Observations sur le genre *Phlebotomus*. ii. Phlébotomes du Nouveau Monde. (Phlébotomes du Brésil et du Paraguay).**—*Bull. Soc. Portugaise des Sci. Nat.* 1920. Vol. 8. No. 3. pp. 215–236. With 4 text figs.

The South American species of *Phlebotomus*, particularly those appertaining to Brazil and Paraguay, are here dealt with, the European and North African species having been considered in *Broteria*, ser. zool. 1919. Vol. 17. Certain species are redescribed, a new species (*P. migonei*) from Paraguay is described, and the males of the seven known species are differentiated in a synoptical table.

Reviewing the genus as a whole the author now proposes to segregate the species in three subgenera as follows:—

Phlebotomus: spines on the upper and lower claspers; distal segment of the upper claspers elongate; middle claspers with fimbriated digitiform appendage. Type, *P. papatasii*.

Sergentomyia: spines on upper claspers only, distal segment of these claspers generally small; middle claspers simple. Type, *P. minutus*.

Lutzia: spines on upper and middle claspers. Type, *P. longipalpis*.

The author proposes to bring out a monograph of the *Phlebotomines* of the whole world, and for this purpose he makes a general appeal for specimens—particularly from Central and Southern Africa, Madagascar, America, Asia, and Oceania—and notes of habits, etc., addressing his appeal from Collares in Portugal.

A. A.

NEWSTEAD (R.). **On the Genus *Phlebotomus*. Part iv.**—*Bull. Entom. Res.* 1920. Dec. Vol. 11. Part 3. pp. 305–311. With 4 text figs.

The male of *P. antennatus*, Newstead, is described. *P. sergenti*, Parrot, is described: the male can be distinguished from every other species possessing paired brushes between the superior claspers, by the great length of the subproximal spine of those claspers; but except for its smaller size the female is not to be distinguished from *P. papatasii*. *P. signatipennis* is described as a new species having as a characteristic feature an extremely small submarginal cell.

A. A.

NEWSTEAD (R.) & SINTON (J. A.). **On a Collection of *Pappataci* Flies (*Phlebotomus*) from India.**—*Ann. Trop. Med. & Parasit.* 1921. Apr. 27. Vol. 15. No. 1. pp. 103–106.

The species of *Phlebotomus* here recorded were collected (with the exception of one specimen) at Dera Ismail Khan, Tank, Bannu, the Tochi Valley, and other places on the North-West Frontier of India. They include *P. papatasii*, *P. minutus*, *P. minutus* var. *antennatus*, and *P. sergenti*.

A. A.

FRANÇA (C.). **Sur la détermination spécifique d'une femelle de Phlébotome.**—*Bull. Soc. Path. Exot.* 1921. Jan. 12. Vol. 14. No. 1. pp. 23-24.

The author gives a table rather too esoteric for reproduction for the discrimination of the females of the European species of *Phlebotomus*, from which he determines the species taken by MANSION in the Rhône District, and assigned by him to *P. papatasi*, to be really *P. perniciosus*.

A. A.

LARROUSSE (F.). **Nouvelle espèce américaine du genre *Phlebotomus*.** *Phlebotomus Brumpti*, **sp. nov.**—*Bull. Soc. Path. Exot.* 1920. Oct. 13. Vol. 13. No. 8. pp. 659-662. With 3 text figs.

This new species of *Phlebotomus* comes from Brazil and resembles *P. vexator*, Coquillett, from North America in having five spines on the upper claspers of the male.

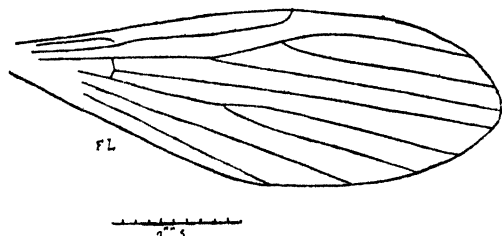


Fig. 1. Wing of *P. Brumpti*, ♂.

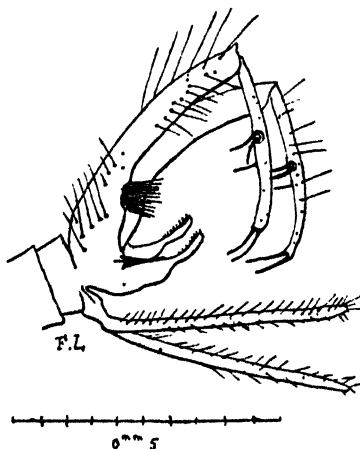


Fig. 2. Genital armature of *P. Brumpti*, ♂

[Reproduced by permission from *Bulletin de la Société de Pathologie Exotique*.]

The wing of the male is three times as long as broad; the first longitudinal vein ends almost at the level of the branching of the first submarginal cell: the first submarginal cell is three times as

long as its stem. The proximal segment of the upper claspers of the male has a conspicuous tuft of hairs in the proximal half of the ventral border; the distal segment is long and uniformly slender, and has two spines at the tip, two on a common tubercle about the middle of the inner surface, and one a little beyond the middle of the ventral border. The lower claspers are very long, uniformly slender, and unarmed. Abdominal hairs recumbent.

The author gives a catalogue of nine American species of *Phlebotomus*.

A. A.

PARROT (L.). **Sur une Variété nouvelle de *Phlebotomus minutus*, Rond.** Bull. Soc. Hist. Nat. Afrique du Nord. Algiers. 1921. Feb. 15. Vol. 12. No. 2. pp. 37-40. With 1 fig. [Summarized in Rev. Applied Entom. 1921. Vol. 9. Ser. B. p. 95.]

Phlebotomus minutus var. *fallax* is here characterized.

A. A.

PARROT (L.). **Sur l'armure génitale des phlébotomes du groupe *minutus*, Rondani, et sur *Phlebotomus fallax*, nov. sp.**—Arch. Instituts Pasteur de l'Afrique du Nord. 1921. Mar. Vol. 1. No. 1. pp. 99-102. With 1 text fig.

Phlebotomus fallax is proposed as a new species approximate to *P. minutus* and its variety *africanus*, but distinguished from the last by the slenderer make of the male claspers and by the absence of the bristle-like spine at the middle of the lower border of the distal segment of the upper claspers.

The author formerly considered *P. fallax*, which has been found in several places in Algeria and Tunis, to be a variety of *P. minutus*.

A. A.

KIEFFER (J.J.). **Sur quelques diptères piqueurs de la tribu des *Ceratopogoninae*.**—Arch. Instituts Pasteur de l'Afrique du Nord. 1921. Mar. Vol. 1. No. 1. pp. 107-115. With 6 text figs

The *Ceratopogoninae* of the *Leptoconops* alliance are here by Kieffer generically distinguished, by female characters.

The author also describes three new species of the *Leptoconops* group, namely *Microconops vexans*, *Tersesthes camelorum*, and *Holoconops transversalis*; and two new species of *Culicoides*, namely *C. cordatus* and *C. sergentii*, the last being proposed as type of a new subgenus *Diplosella*: all are from N. Africa, except *C. cordatus*, which is from the neighbourhood of Libau.

Two new genera of the *Atrichchopogon* group are incidentally proposed and briefly characterised, namely *Lasiohelca* and *Gymnohelca*.

A. A.

CARTER (Henry F.), INGRAM (A.) & MACFIE (J. W. S.). **Observations on the *Ceratopogonine* Midges of the Gold Coast with Descriptions of New Species. Parts 1, 2 and 3.**—Ann. Trop. Med. & Parasit. 1920. Nov. 27. 1921. Feb. 8. Vol. 14. Nos. 2 & 3; pp. 187-208. With 3 plates; pp. 211-274. With 27 text figs, and 2 plates; pp. 309-331. With 13 text figs.

A full and good description of the external anatomy of *Culicoides*, that of the adult being particularly complete. It is preceded by a

general introduction in which the bionomy is carefully considered; is followed by excellent descriptions of the adult, and also in most cases of the larva and pupa, of all the local species of the genus, no less than eleven of which are new; and is concluded with a tabulated synoptical summary of the species. Would that all systematic zoology were set forth in this masterly style

Part 3 gives descriptions and figures of six new species, namely *Prionognathus marmoratus*, *maculipennis*, *pseudomaculipennis*, and *maculithorax*, *Atrichopogon xanthaspidium*, and *Stilobezzia spirogyrae*.

Prionognathus is characterized as a new genus allied to *Culicoides* but still more closely related to *Alluaudomyia* of Kieff, from which it differs only in the absence of microscopic pubescence from the wings, though long hairs are present on the distal portion of the wings.

A. A.

CARTER (Henry F.). **A Revision of the Genus *Leptoconops*, Skuse.**—*Bull. Entom. Res.* 1921. June. Vol. 12. Part. 1 pp. 1-28. With 10 text figs.

This is a very full and comprehensive account of the Ceratopogonine genus *Leptoconops*, the author having examined the majority of the known species of the genus, including the genotype, *L. stygius*. The author concludes that *Tersesthes* of Townsend, *Centrotypus* of Grassi, *Mycterotypus* of Noe, *Mycteromyia* of Lutz, and *Holoconops* and *Schizoconops* of Kieffer, are all synonyms of *Leptoconops* (*sens. lat.*). The species of *Leptoconops* are widely distributed round the globe, but so far as is known are confined between 40°N. and 35°S., approximately. Nothing is known of the life-history or early stages, and comparatively little of the habits of the adults beyond the fact that some of the species are notorious for their bite and at certain seasons are serious pests to man and domestic animals. GRASSI endeavoured to infect *L. irritans* with malaria parasites, but was unsuccessful.

In the description of the genus a very careful account of the superficial structural features is given. In the systematic classification the species are arranged in three subgenera, namely, *Leptoconops* (s.s.), in which which the antennae of the female consist of 14 segments; *Holoconops*, in which the antennae of the female consist of 13 segments; and *Acanthoconops* (a new subgenus), which is distinguished from *Leptoconops* (s.s.) in having the front clothed with bristles or spines.

All the species and varieties, to the number of 18, are carefully described and their distinguishing characters are also summarized in tabular form.

A. A.

WOLLMAN (E.). **Le rôle des mouches dans le transport de germes pathogènes étudié par le technique des élevages aseptiques.**—*C. R. Acad. Sci.* 1921. Jan. 31. Vol. 172. No. 5. pp. 298-301.

This paper gives the results of infection experiments with flies reared by the aseptic method (described in *Ann. Inst. Pasteur*. Vol. 25, p. 79) which starts with sterilizing the egg.

Sterilized eggs of the common blowfly, the green blowfly, and the house-fly were placed under sterile conditions on a sterilized pabulum. When the maggots appeared, suspensions of *Bacillus typhosus*, or

B. dysentericus, or *B. tuberculosis* were introduced, or in some cases, *B. anthracis*.

The contents of pupae reared under such conditions gave positive cultures of the respective microbe. But the flies issuing from such pupae sometimes gave positive cultures, and sometimes did not; and if the puparia were sterilized by washing and were kept in sterile tubes, the issuing flies—whatever the infection—were always clean. The author, therefore, concludes that pathogenic germs ingested in the maggot stage do not pass on to the fly unless by germs adhering to the surface of the pupa.

House-flies infected with pure cultures of *B. typhosus*, *B. dysentericus*, and *B. tuberculosis* were enclosed in sterile vessels containing absorbent cotton wool moistened with sugar and water: kept unchanged in these circumstances they were persistently infective, in one case for more than three weeks; but if the vessel in which they were kept was changed every day, or every second day, they became clean very much sooner, in some cases in about 8 days, and in one case (where the infection was *B. tuberculosis*) in 4 days.

A. A.

HILL (G. F.). *Musca domestica*, Linn., as a "Bush Fly" in Australia. — *Ann. Trop. Med. & Parasit.* 1921. Apr. 27. Vol. 15. No. 1. pp. 93-94.

The author has frequently captured *Musca domestica* on stock and carcasses at distances up to two miles from dwellings in the Darwin district. On one occasion he found them on fresh carcasses of buffaloes in scrub three to six miles from the nearest dwelling, which itself was 16 miles distant from any other dwellings and 30 miles distant from a town. On two occasions he has taken full-grown maggots of *M. domestica* in decaying vegetable matter forming the stranded but occupied nests of grebes.

A. A.

AWATI (P. R.). **Bionomics of Houseflies. IV. Some Notes on the Life-History of *Musca*.**—*Indian Jl. Med. Res.* 1920. July. Vol. 8. No. 1. pp. 80-88.

The species under observation are *Musca divaricata* (? *nebulo*) and *M. promisca* (? *angustifrons*). The mean temperature was 82° F. The flies were provided with fresh goat-dung taken from the bowel of a slaughtered animal, fresh human faeces, and syrup and banana juice; this provision was made daily, the stale material being removed for examination. Horse dung was not used as it was invariably infected with nematode parasites of house-flies. The following are the principal results of the observations:—

Flies became sexually mature from five to eight days after emergence; females did not require to be fertilized more than once in life, and began to lay eggs from four to ten days after pairing; many more than four batches of eggs were laid in an individual lifetime. *M. divaricata* preferred goat dung, *M. promisca* preferred human faeces for its eggs. *M. divaricata* did not lay less than 50 eggs, *M. promisca* never more than 50 in a batch. Unfertilized females laid eggs, which did not hatch. There was no appreciable difference of longevity in the sexes. The complete life-cycle—egg to egg—was 20 to 30 days for *M. divaricata* and 19 to 28 days for *M. promisca*.

A. A.

AWATI (P. R.). **A Note on the Genitalia of Portchinsky's Species *M. corvina* (Vivipara) and *M. corvina* (Ovipara).**—*Indian Jl. Med. Res.* 1920. July. Vol. 8. No. 1. pp. 89–92. With 1 plate

The author has examined the genitalia of these two forms and pronounces them to be two perfectly distinct species, which should therefore be referred back to their specific names; *M. corvina*, Fabr. and *M. autumnalis*, Dig. He thus confirms the suspicions of BEZZI that PORTCHINSKY had confused two closely related species.

A. A.

PLATH (O. E.). **A Muscid Larva of the San Francisco Bay Region which sucks the Blood of Nestling Birds.**—*Univ. California Public. Zool.* 1919. Feb. 7. Vol. 19. No. 5. pp. 191–200.

In introducing his own observations the author refers to the discovery by DUFOUR in 1844 of larvae of *Lucilia dispar* sucking the blood of young swallows, and to similar cases of parasitism since then recorded of the larvae of *Protocalliphora azurea* and *P. chrysorrhoea*, besides other more notorious species.

In an investigation extending over 11 weeks in 1917 the author examined 63 nests of 5 species of birds, and in 39 cases he discovered bloodsucking Muscid larvae, the number in the individual nest ranging from 8 up to 155, and the species in every case but one being *Protocalliphora azurea*. He satisfied himself by plentiful experiment not only that the larvae ingested blood, and actually attached themselves to nestlings, but also that they would not eat such substances as fruit, bread, meat, and boiled potato, though they would feed on the blood contained in a raw beef-bone (but not on simple shed blood of man or ox). According to the author's observations, from five to ten per cent. of the parasitised nestlings die from loss of blood, and some that withstand their attack are much weakened.

A. A.

MARCHAND (Werner). **The Early Stages of Tabanidae (Horse Flies).**—*Monographs of the Rockefeller Institute for Medical Research.* 1920. Nov. 15. No. 13. 203 pp. With 15 plates. 1920. New York: The Rockefeller Institute for Medical Research.

This is a useful summary of present knowledge of the subject, not entirely critical, but quite enough so to be extremely helpful. Introduced by a historical resumé, which begins with a paper published by DE GEER in the Transactions of the Royal Swedish Academy for 1760 on the larval and pupal stages of the European *Tabanus bovinus*, and ends with some notes on the eggs and larvae of some South American species of *Tabanus* by BODKINS and CLEARE in the *Bull. Entom. Res.* for 1916, its contents include both general accounts of the Tabanid type of larva and pupa and particular descriptions of eggs and larvae and pupae of numerous species of *Tabanus*, *Chrysops* and *Haematopota*. There are also notes on Hymenopterous parasites of eggs of *Tabanus*, and a reference to Nematode parasites repeatedly found by the author himself in larvae of a *Chrysops*—a rather suggestive discovery. Outside the three genera above mentioned hardly anything is known of other Tabanid larvae, except BRAUER's account of the larva and pupa of *Hexatoma pellucens*, and several accounts

of the early stages of *Goniops chrysocoma*, the larva of which is quite peculiar among Tabanidae so far known in being piriform and not at all pointed at the ends; the mother fly in this species, too, guards her egg-mass sometimes for a week. The paper ends with notes on methods of rearing Tabanid larvae, and a bibliography.

A. A.

HILL (G. F.). **The Bionomics of *Tabanus aprepes*, and other Australian Tabanidae.**—*Bull. Entom. Res.* 1921. June. Vol. 12. Pt. 1. pp. 41–62. With 21 text figs.

The breeding circumstances and the post-embryonic history and development of *Tabanus aprepes*, *T. rufinotatus*, *T. nigratarsis*, and *Silvius notatus* are here described in very careful detail and with particular completeness in the case of the species first named.

The chief breeding-places of *T. aprepes* are shallow swamps that dry up in the winter. The eggs are laid on herbage overhanging the water, the number in a mass averaging about 500, and they hatch in 6–7 days. The larvae, which begin and accomplish their first moult while and within a few hours of hatching, appear to be entirely aquatic until they are full grown, when they leave the water and bury themselves in high ground close by, but do not pupate for several months afterwards. The entire larval period, as observed in the laboratory, ranged from 164 to more than 239 days, a larva of the latter age having been killed for examination. The usual difficulties occurred in rearing larvae under laboratory conditions; when an entire brood (from 300 to 600 eggs) was reared in a single receptacle, only 1–2 per cent. reached the imago stage, although plenty of suitable food, etc., was supplied. The pupal stage ranged from 8 to 20 days. The author remarks that the adults of this species show considerable variation in the colouring of wings and abdomen.

The egg-masses and the larvae of *T. rufinotatus* are not easy to find. The larvae were observed to have undergone their first moult within 21 hours of hatching. Under laboratory conditions the larval period occupied $8\frac{1}{2}$ months. Larvae were once captured in association with those of *T. aprepes* and *nigratarsis*, and once with those of *Silvius notatus*.

The breeding-places, larva, and pupa of the last two species are described from a limited capture of apparently full-grown larvae in each case.

A. A.

NEWSTEAD (R.) & EVANS (Alwen M.). **New Tsetse-Flies (*Glossina*) from the Belgian Congo.**—*Ann. Trop. Med. & Parasit.* 1921. Apr. 27. Vol. 15. No. 1. pp. 95–102. With 6 text figs.

Glossina schweyzi is described from six males and five females captured by Dr. SCHWETZ in the Kwango River region of Belgian Congo near the Angola frontier, as a new species of the *G. fusca* group. The male resembles *G. tabaniformis* and the female resembles *G. brevipalpis*. The diagnosis of the species is as follows:—"Hairs of the third antennal segment about one-sixth to one-seventh the width of the segment; wings of the female with the thickened portion of the anterior transverse vein darker in colour than the rest; harpes of the male divided into three processes, the proximal process short

and spine-like; female with signum of the uterus consisting of a single chitinous plate, the long axis transverse and widest in the distal third."

Glossina fusca var. *congolensis* is also described as a new variety from 14 specimens, including both sexes, captured by Dr. SCHWETZ in the Katombe and Lomami-Kisengwa districts of Belgian Congo.

The diagnosis is as follows:—"Colour and pattern generally as in typical *G. fusca*, Walker, but the wings are usually more heavily infuscated. Harpes of male with the proximal process reaching to the tip of the second (serrated) process; bilateral portions of the signum of the uterus of the female subrotund."

A. A.

JOHANNSEN (O. A.). **The First Instar of *Wohlfahrtia vigil* Walker.**—*Jl. Parasit.* 1921. Mar. Vol. 7. No. 3. pp. 154-155.

Wohlfahrtia vigil, like other Sarcophagidae, is larviparous, and the new-born larva, observed by the author, is here described, the species sometimes being parasitic on man. A list of references is appended.

A. A.

PATTON (W. S.). **Cutaneous Myiasis in Man and Animals in India.**—*Indian Med. Gaz.* 1920. Dec. Vol. 55. No. 12. pp. 455-456.

As the result of a continued and extensive investigation the author has discovered the maggot of *Chrysomyia* (*Pycnosoma*) *bezziana* to be the one most baneful to man and animals in India. It is a species heretofore known only in Belgian Congo and West Africa, where also its maggot is hurtful to animals. According to the author, it lays its eggs only in or on *living* tissues, and the maggots die if placed on a dead animal. The author emphasizes the importance of this fact and also the significance of the fact that the adult fly has never been seen in nature.

Among other harmful species of maggots in India, the author has observed *Lucilia argyrocephala* (in animals), *Chrysomyia* (*Pycnosoma*) *dux* (in animals), *Apiochaeta xanthina* Speiser (*ferruginea* Brunetti) in man and animals, and a *Sarcophaga* in man.

(Among maggots infesting the *intestine* of man, the author has observed *Philaematomyia crassirostris* and a species of *Sarcophaga*.)

A. A.

CRAGG (F. W.). **The Distribution of the Indian Species of the Genus *Xenopsylla* with reference to the Immunity of Certain Areas from Plague Epidemics.**—*Indian Jl. Med. Res.* (Special Indian Science Congress Number, 1920). pp. 29-34.

The facts propounded in this paper are that whereas *Xenopsylla cheopis* has been assumed to be the one and only species of rat-flea existing in India, a careful examination, by the author, of 4,270 rat fleas collected in 18 Indian stations, has disclosed 2.7 per cent. to be *X. brasiliensis*, 29.8 per cent. to be *X. astia*, and only 64.5 per cent. *X. cheopis*—the remaining 2.89 per cent. being *Ceratophyllus*.

These being the facts, the author points out that as all the species of a genus cannot be assumed to be alike in their physiological reactions, in their length of life and fecundity and rate of development under

differing meteorological conditions, in their resistance to unfavourable circumstances, and in their idiosyncrasies of habit, so these species of rat-fleas may not be assumed to be alike in their susceptibility to infection by the plague bacillus and in their propensity to attack man, and so may not be alike in their capability of spreading plague from rat to rat and from rat to man.

[The author's argument is worthy of respectful consideration; but it may equally be maintained that all the individuals of a species may not be assumed to be quite alike in physiological susceptibilities and reactions, also that the criteria of species fluctuate; and, therefore, that the argument is rather more academic than the author is disposed to allow.]

As far as the author's observations go, *X. cheopis* appears to predominate in the cooler parts of India, and *X. astia* in the warmer and damper parts, and *X. brasiliensis* has been found hitherto only in Poona, Mangalore, Bombay city, and Ootacamund.

A. A.

JORDAN (Karl) & ROTHSCHILD (N. Charles). **On *Ceratophyllus fasciatus* and some Allied Indian Species of Fleas.**—*Ectoparasites*. London. 1921. Jan. 15. Vol. 1. Pt. 3. pp. 178–198. With 30 text figs.

This paper is the outcome of a question by Mr. Tertius CLARKE regarding some possible significance in the geographical distribution of *Ceratophyllus fasciatus*. The authors have examined a certain amount of Indian material, and although they find in it eight species of *Ceratophyllus* from rodents, and all of them not distantly related to *C. fasciatus*, the only Indian specimens of true *fasciatus* are one from a brown rat in Bombay and one from a buffalo at Bareilly.

A. A.

i. ROTHSCHILD (N. Charles). **The Generic Name of the Sand-Flea.**—*Ectoparasites*. London. 1921. Jan. 15. Vol. 1. Pt. 3. pp. 129–130.

ii. JORDAN (Karl) & ROTHSCHILD (N. Charles). **A New Species of *Sarcopsyllidae*.**—*Ibid.* pp. 131–132. With 2 text figs.

i. The author is much obliged to Mr. J. H. DURRANT for having drawn his attention to a compilation by Felix Paul JOROCKI, written in Polish and published in Warsaw, where in the sixth volume dated 1838, the sand flea is diagnosed and figured as *Tunga penetrans*. As the generic name *Sarcopsylla* of Westwood was given in 1840, and *Dermatophilus* Lucas in 1839, *Tunga* takes precedence. The chiggers, therefore, must by law of priority be called *Tunga*.

ii. The author's figure and describe a new species of *Tunga* found in the ear of sewer rats from Ning-po in China. This species, *Tunga caecigena*, is quite devoid of eyes, has the fourth segment of the maxillary palp twice as long as the second, and has three bristles on either side of the fifth segment of the tarsus of the first pair of legs.

A. A.

BUXTON (P. A.). **On the *Sarcoptes* of Man.**—*Parasitology*. 1921. June. Vol. 13. No. 2. pp. 146–151. With 9 text figs.

The author has made a careful study of the external anatomy of the itch-mite of the horse as a basis and standard (*Parasitology*.

1921. June. Vol. 13. pp. 114-145), and he deals here with the itch-mites of man, our knowledge of which is, as he says, not very satisfactory.

His human material has been collected from a large number of different cases, both civil and military, and he therefore feels justified in assuming that he is dealing with human itch and not with equine scabies in man. As the result of very careful and detailed comparison, he comes to the conclusion that the common itch-mite of man and that of the horse are varieties of one species, *Sarcoptes scabiei*, de Geer. Certain minute differences exist in the scales and spines of the two varieties, but they are not constant and the measurements overlap. Size, pigmentation of female plastron, and extent of bare areas (rugose areas) have no taxonomic significance.

As regards the mite associated with Norwegian crusted scabies, *Sarcoptes scabiei crustosae* of Fürstenberg, he finds that it can be distinguished from the common itch-mite, *Sarcoptes scabiei* var. *hominis* by one character only, namely the greater size of the spines—a character that can be appreciated only by means of an oil-immersion lens and a micrometer, and may reasonably be regarded as merely varietal. He therefore names it *Sarcoptes scabiei* var. *scabiei-crustosae*.

He furthermore gives at full length a reasoned argument to justify the conjecture that Norwegian crusted itch may be a condition due to a secondary infection with *Aspergillus*.

A. A.

STEKHOFEN, Jr. (J. H. Schuurmans) & NOTOKWORO (Haden Mas). **Zur Biologie der Krätzmilben.** [The Biology of the Itch-Mite.] —vii + 152 pp. With 1 folding plate and 92 text figs. 1921. Apr. Amsterdam: Johannes Müller. [Verhandl. Konink. Akad. v. Wetenschappen Amsterdam. (2nd Sectie). Deel 21. No. 2.]

This is a full descriptive account of the embryonic and post-embryonic development under various conditions, and of certain points in the anatomy and physiology of the itch-mite of the rat, *Notoedres notoedres*. An appendix contains some remarks on the anatomy and biology of the itch-mite of the cat, *Notoedres cati*, the respiration of *Myobia musculi*, and the egg, larva and powers of endurance of *Myocoptes musculinus*, mites living in the fur of the rat and mouse respectively.

A. A.

DICKSON (W. E. Carnegie). **Mites as Internal Parasites of Man.**—*Jl. Trop. Med. & Hyg.* 1921. Feb. 1. Vol. 24. No. 3. pp. 25-27. With 2 text figs.

Report of two cases where mites and their eggs were found in the urine. One was a young unmarried woman who had suffered for many years from symptoms referred variously to chronic Bright's disease, cystitis, etc. The urine contained much epithelium, some albumin, hyaline casts, and pus, and, in a centrifugated sample, some eggs, a larva, and three adult female mites; more ova and mites were discovered in another centrifugated sample drawn by catheter. Examination of the bladder by cystoscope revealed an aggregation of pinkish elevations on the trigon. After prolonged treatment, the details of which are reserved for future publication, the patient's condition improved and mites could not be found. The mites were identified as *Aleurobius farinae* (the common flour-mite).

In the other case, a man of middle age, the bladder appeared quite healthy, though mites and ova were found in the urine passed, their exuviae and fragments in urine drawn by catheter, and a nymph in urine drawn from the right ureter. The mites were identified as *Tarsonemus* [but the figure so named is not that of a *Tarsonemid*]. The patient in this case was suffering from leucocythaemia, with enlargement of the spleen and general enlargement of the lymphatic glands; but the author does not explicitly suggest that these conditions were the result of infestation with mites. The patient at last died. Before death he had symptoms of cystitis and pyelitis, but no mites were then discovered in his urine; nor was post mortem examination permitted.

A. A.

FINDLAY (William F.). **Cheese-Mite Itch and Conjunctivitis. A "Minor Horror" of the Great War.**—*New Zealand Med. Jl.* 1921. Apr. Vol. 20. No. 96. pp. 146–150; and *New Zealand Jl. of Health & Hospitals.* 1921. Mar. Vol. 4. No. 3. pp. 57–60.

Cheese is infested not only by the cheese-mite *Tyroglyphus*, but also by the flour-mite (*Aleurobius*), the sugar-mite (*Glyciphagus*), the fruit and jam-mite (*Carpoglyphus*) and the bulb-mite (*Rhizoglyphus*).

The species implicated in the cases of conjunctivitis and itch here recorded was *Tyroglyphus longior*. The cases occurred among people handling cheese in stores in New Zealand, where, owing to difficulties of transport due to the war, the storage of cheese was abnormally protracted. For the dermatitis ordinary soothing ointments were found effective, betanaphthol ointment particularly so. For the conjunctivitis the routine conjunctival treatment was promptly efficacious. If the temperature of the store-house kept constantly at 35° F. the mites did not become troublesome, but were not killed. Good results were obtained with carbon bisulphide, 13 lb. to 5,000 cub. feet; this kept the mites down for six months. The brushing of shelves, etc., with a 5 per cent. solution of carbolic acid is also recommended.

A. A.

RODHAIN (J.). **Remarques au sujet de la Biologie de l'*Ornithodoros moubata*.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1920. Nov. Vol. 1. No. 1. pp. 133–138.

The author reinforces his previous statements as to the resistance offered by dense humid forests to the spread of *Ornithodoros moubata*, owing to its preference for more arid savannah tracts. He states that the species now exists west of Boma from the R. Lukunga to the Atlantic littoral. By experimental observations he finds that *O. moubata* can live and thrive in all stages of its existence, and can give issue to healthy fertile eggs, on the blood of cold-blooded Vertebrates, e.g. snakes (including the venomous *Causus rhombeatus*) and geckos.

A. A.

SENEVET (G.) & VIALATTE (Ch.). **A Propos d'*Ornithodoros maroccanus* Velu, 1919.**—*Bull. Soc. Path. Exot.* 1921. June 8. Vol. 14. No. 6. pp. 331–333.

VELU in 1919 described *Ornithodoros maroccanus*, a new species attacking man and pig, from Morocco; he placed it near *O. turicata*.

The authors have examined VELU's specimens and compared them with other specimens of their own from the same country, and they have discovered that, besides its affinities with *O. turicata*, *O. maroccanus* also resembles *O. talaje* in possessing lateral flaps to the camerostome.

A. A.

MARTIAL (R.) & SENEVET (G.). **Présence à Fez d'*Ornithodoros talaje* (Guérin-Ménéville, 1849). Action pathogène sur l'homme.**—*Bull. Soc. Path. Exot.* 1921. Jan. 12. Vol. 14. No. 1. pp. 24-26.

Ornithodoros talaje is commonly supposed to be an American tick, NUTTALL and his collaborators doubting the correctness of the determination of those who have reported its existence in the Aral region and in Venice. The present authors now report the species from Fez, and describe the effects of its bite. The patient, a female, received at least 20 bites in the course of a night. The local effects were intense and extensive, itching lasting for four weeks, and petechiae, which did not disappear entirely for 5 months. About 36 hours after being bitten the patient showed signs of collapse—nausea, which persisted for 15 days, and great weakness of the pulse; from the 4th to the 8th day afterwards the temperature was at 38.7° C. The authors attribute this introduction of *O. talaje* to pigeons.

A. A.

HOUSSAY (B. A.). **Action physiologique du venin des scorpions (*Buthus quinquestriatus* et *Tityus bahiensis*).**—*Jl. de Physiol. et de Path. Gén.* 1919. Vol. 18. No. 2. pp. 305-317.

The active principle of these venoms is soluble in water and in glycerine, but not in alcohol, ether, chloroform, etc. The toxin is thermolabile (to 70°), is absorbed by animal charcoal, and does not pass through a Berkefeld filter. The aqueous extract of the venom gland of *Buthus quinquestriatus* has no diastatic action. The venom studied is above all a muscle poison of the veratrin type, and a powerful salivary and lachrymal stimulant; it increases reflex excitability, has generally a hypertensive action somewhat similar to that of adrenalin, and causes contraction of unstriated muscle. The respective antitoxins are strictly specific.

A. A.

ALLEN (A. H.). **A Case of Poisoning by Jellyfish.**—*U.S. Nav. Med. Bull.* 1920. July. Vol. 14. No. 3. pp. 396-397.

The case occurred in the York river. The jellyfish are merely referred to as "of the white variety." The immediate symptoms were intolerable burning and itching, followed in 15 minutes by violent coryza. Erythema and profuse weeping eczema supervened. After 10 hours of unsuccessful local treatment, the intense irritation was relieved by a hypodermic injection of morphia. Subsequently the patient lost his voice, and haemorrhages were observed in the right vocal cord. The inflammation of the vocal cord persisted for over four weeks, the appearance resembling tubercular laryngitis.

A.A.

PELLAGRA.

WILSON (Wm. H.). **The Diet Factor in Pellagra.**—*Jl. of Hyg.* 1921. July. Vol. 20. No. 1. pp. 1-59. With 3 charts in text.

The paper opens with a discussion of the fundamental question of protein assimilation. The sufficiency of protein must not be reckoned by its gross weight, but by its assimilable value. In other words, the important factor is the biological value of the protein. Proteins differ considerably in their biological value. For estimating the comparative value of a given amount of protein one has to divide the total quantity by one of the following factors:—Animal protein, 1; rice protein, 1·12; potato, 1·27; pulse, 1·82; wheat flour, 2·55; maize, 3·4. Thus a man weighing 70 kilos, to maintain his nitrogenous equilibrium, must take 30 grains of protein daily if he take meat as his source, but 102 grams of protein if he consume the maize variety. The figure 40 may be taken as the minimum of safety for the biological value of protein, though many healthy individuals may escape disease with a B.P.V. of only 20. When hard labour is indulged in 50 would be a safer figure, and for a community with chronic intestinal disease, or one previously affected with pellagra, a figure even of 60 is not too high.

With these preliminary considerations the author discusses the diets associated with the various outbreaks of pellagra throughout the world, and shows clearly the connection between deficient protein and the disease.

1. *The Outbreak among Armenian Refugees at Port Said.*—The diet which presumably caused the outbreak had a B.P. value as follows:—For males (fifteen years and upwards), 23; for females (fifteen years and upwards), 18·4; for children (five to fourteen years), 13·8; for children up to four years, 7·3. Later the diet was revised and two new scales were instituted, one for the healthy and the other for those who had suffered from pellagra or were ill-nourished. The B.P.V. of the former diet was 43·7 and of the latter 59·15. On these diets the disease practically disappeared.

2. *The Rankin Farm Experiment.*—The diet administered by GOLDBERGER and WHEELER to convicts, some of whom developed pellagra, showed a B.P.V. of only 1·46.

3. *Diet of Italian Peasants.*—The diet of a hired peasant in the province of Ferrara, where pellagra incidence is about 3 per cent., is as follows:—For eight months of the year B.P.V., 30·4, while for four months of the year it is 43. These figures are higher than those of the Armenian Refugee Camp, and the pellagra incidence is correspondingly lower.

4. *Individual Cases among Egyptian Fellahin.*—Case A. Boy, aged 11; B.P.V. of the diet which caused pellagra had a value of 10·4; on raising the B.P.V. to 24·9 a cure was effected.

Case B. Boy, aged 12; B.P.V. of diet causing pellagra, 1·17. The boy was cured by increasing this figure.

Case C. Boy, aged 15. In this case the B.P.V. of the diet producing intense pellagra was only 10.

5. *Turkish Prisoners of War in Egypt.*—The diet under which a large number of cases of pellagra developed was as follows:—For the non-labour group the B.P.V., after calculating the loss of nitrogen in the faeces, was 33·5. For the labour group, after similar allowance

for faecal nitrogen loss, the B.P.V. was 36·8. The labour group showed a considerably greater pellagra incidence than did the non-labour group.

6. *Convicts in Egypt*.—Among convicts on hard labour receiving a diet of B.P.V. 48·5, the pellagra incidence was 4·4 per cent. Among moderate labour convicts receiving B.P.V. of 33·5 the incidence was 2·8 per cent.; while among light labour convicts receiving the same diet as the preceding class the incidence was only 1·5. On a diet containing protein of biological value of 54·7 most of the cases recovered rapidly.

7. *Intra-mural Cases of Pellagra in Egyptian Asylums*.—These results may be passed over since it is so difficult with insane patients to be sure that the diet provided was actually consumed.

The remaining dietaries discussed in this section are those which are seemingly very poor, and yet pellagra does not develop amongst those subsisting upon them. In all, the B.P.V. was higher than 40.

The second part of the paper deals with other factors which may possibly play a part in the etiology of pellagra. These are :—

- " (1) Deficiency in accessory food substances.
- " (2) Deficiency of fats and lipoids.
- " (3) Deficiency of protein.
 - " (a) Absolute deficiency of intake below the normal requirements.
 - " (b) Deficiency relative to individual or energy requirements.
 - " (c) Deficiency due to low availability of protein resulting from the nature of the food or defective preparation.
 - " (d) Secondary deficiency due to excessive bacterial destruction of protein in the intestine or defective powers of digestion or assimilation."

The significance of indicanuria is discussed.

Three types of pellagra may be distinguished etiologically :—

- " (a) The common type seen in poverty or deficient food from other causes.
- " (b) Relapse cases in which, owing to permanent defects—the result of a previous attack of pellagra—the protein supply is inefficiently utilized.
- " (c) Cases in which a disease of the digestive organs, due to other causes than insufficient feeding, leads to defective utilization of the protein intake."

[This paper undoubtedly is destined to become a classic. That protein deficiency is an important factor in pellagra etiology can no longer be doubted.]

A. D. Bigland.

Wood (Edward J.). *Pellagra*.—*Edinburgh Med. Jl.* 1920. Dec. Vol. 25. No. 6. pp. 363–374. With 1 chart.

This paper constitutes a clinical lecture delivered to graduates at the Royal Infirmary, Edinburgh, on Aug. 9, 1920. A case was shown and described in detail. The chief points are as follows :—

Married woman aged 52 years. Patient had lived in Edinburgh continuously for the last thirty years. Six or seven years ago, during the summer, she noticed a redness of the forearms. Four months ago, weakness of the legs was noticed, and erythema appeared on hands, forearms and neck. Then followed soreness of the mouth and slight salivation. Admitted to the Royal Infirmary two months ago for neurological condition.

Weakness was profound, especially in the lower limbs, no mental symptoms of any kind, all the deep reflexes were absent, and the plantar reflex was flexor. The pupils were normal. The voice suggested the neuritis of diphtheria. Sensation was practically normal though the muscles were somewhat tender on deep pressure. The vibratory sense was fully investigated, the vibration time being considerably reduced except over the sacrum. There was no diarrhoea.

The etiology of pellagra was next discussed and modern views brought forward. The lecturer stated that his personal view was in favour of the food deficiency hypothesis. Under the heading of treatment, he gave his experiences with the giving of maize germ to pellagrins. In one case the result was most encouraging.

A. D. B.

MACNEAL (Ward J.). **Pellagra.**—*Amer. Jl. Med. Sci.* 1921. Apr. Vol. 161. No. 4. pp. 469-501. With 13 figs.

This paper is a resumé of our knowledge on the whole subject of pellagra, and therefore should be consulted first-hand by those wishing a bird's eye view of the subject. The author in the etiological section shows that while food deficiency plays a part in the causation of the disease, another factor, probably an infection, must be taken into account.

A. D. B.

TANNER (W. F.) & ECHOLS (G. L.). **The Occurrence of Pellagra in Patients apparently receiving Ample Diet.**—*Jl. Amer. Med. Assoc.* 1921. May 14. Vol. 76. No. 20. pp. 1337-1338.

After describing a case of pellagra occurring in a woman apparently fed upon a suitable diet, many components of which she did not eat, the authors make the following statement:—"It is not proper to assume that because a patient is provided with a certain diet this also is eaten; there is a danger of drawing erroneous conclusions when the knowledge in hand concerns the available food supply rather than the diet actually consumed by the patient."

A. D. B.

ENRIGHT (J. I.). **The Pellagra Outbreak in Egypt.** [Correspondence].—*Lancet.* 1921. Mar. 19. p. 613.

Dr. Enright in this letter answers his numerous critics [see this *Bulletin*, Vol. 17. p. 148]. It will be remembered that pellagra occurred among German prisoners of war in Egypt, even though the diet was considered as more than sufficient. This fact convinced Dr. Enright that diet deficiency alone was not the cause of pellagra. There must be something else. This is not ascaris infection, as suggested by Dr. H. M. WOODCOCK, since these helminths were not found invariably post mortem. The whole-hearted believers in the diet deficiency theory of pellagra, headed by GOLDBERGER, suggest that the prisoners did not eat the diet ordered for them. Dr. Enright was in medical charge of these prisoners and he states that they did eat their food. GOLDBERGER's remark that two cases of scurvy occurred among the German prisoners, and, therefore, some diet deficiency must have been present, does not directly bear upon the subject, since symptoms of scurvy and not pellagra were noted

amongst recent political prisoners undergoing "voluntary enforced" abstention from food.

In short, the unanswerable argument is that pellagra occurs when diets are deficient, but it does not by any means always occur; therefore, there is something at work more than mere deficiency.

[The best answer to Dr. Enright's critics will be found in the Report on Investigations on Pellagra among Turkish Prisoners of War in Egypt, 1920, by HAMMOND-SEARLE and STEVENSON. *See below.*]

A. D. B.

HAMMOND-SEARLE (A. C.) & STEVENSON (A. G.). **Report of Investigations on Pellagra among Turkish Prisoners of War, in Egypt, 1920. With a Bacteriological Report by Lt.-Col. P. J. Marett.**—66 pp. With 11 charts. [n.d.] Alexandria: Whitehead Morris Ltd.

The work of the Pellagra Commission terminated with the close of the year 1918. The present investigations commenced in March 1920. By this time the work of repatriation was in full swing and therefore the time was short, and only those observations which were feasible under the time restrictions could be carried out.

During the year 1919 there was a great decline in pellagra incidence, but owing to repatriation of many prisoners, especially pellagrins, it is difficult to estimate the importance of diet, etc., in bringing about this decrease.

Among the Turks up to the end of 1919 there had been 9,257 cases out of 105,668 prisoners (*i.e.*, 1 in 11), while among the Germans there were about 79 cases out of 7,606 European prisoners (*i.e.*, 1 in 96). During 1919 there was a total of 1,617 deaths from pellagra; of these about six were German.

In the dietetic section the following results were obtained. Up to April 1919 the diet for non-working European prisoners of war was probably insufficient to prevent pellagra unless supplemented by extra purchases. For the workers the diet though of good biological protein value was poor in calories. As regards the Turks, the diet was of better calorific value but the biological protein value was too low for safety. The advisability of an authorized standard diet for pellagrins in hospital was emphasized.

In the clinical section of the report the question of the supposed similarity between Addison's disease and pellagra is very fully discussed and, in conclusion, the result is arrived at that "adrenal insufficiency is not a marked feature in pellagra." The abnormal action of the sympathetic nervous system, too, is probably not the cause of the early symptoms of the disease. The post mortem changes in the sympathetic nervous system and in the suprarenals are as readily explained by the theory of tissue exhaustion as by a selective involvement of these organs in pellagra.

The pathological findings confirm the results of other workers, especially as regards the abnormal condition of the intestinal mucous membrane and the wasting of all the organs, which is greater than that found in any other wasting disease. There is usually a considerable reduction of bile salts in pellagra.

Various dieting and metabolism experiments were carried out, together with estimations of the Nitrogen content of the urine and faeces, indican, etc. 'An improved method of indican estimation in the

urine is described. [For full details of these experiments the original paper should be consulted.]

Under the last and most important heading, that of etiology, the following points are made. With regard to the diet of the German prisoners of war it is stated that their diet unsupplemented by canteen purchases was "open to the charge of inadequacy;" that the diet was so supplemented by most of the Germans and that "there is evidence that a large proportion of the German pellagra cases were unable to make such extra purchases of food." The authors give it as their opinion that the facts gathered do not preclude the possibility of the food deficiency hypothesis. But following up BIGLAND's work it is clearly pointed out that another factor may be at work which may gain access to the body through damaged intestinal mucosa. In the search for a possible organism behaving in this manner the aid of Lt.-Col. MARETT was invoked. Cultures taken from the faeces of definite pellagra cases and from the small intestine of post mortem cases showed in 90 per cent. of cases organisms undistinguishable from *B. Welchii* and in 85 per cent. of cases terminal or sub-terminal spore-bearing organisms were isolated. Stools from healthy Turks did not show these anaerobes. Samples of maize and maize flour obtained from an endemic pellagra centre in Egypt also showed anaerobic spore-bearing organisms.

It was attempted to produce ulceration in dog's intestines by dysenteric organisms and then to inoculate these anaerobic organisms and watch the results. Unfortunately the dog's intestine could not be made to ulcerate with the dysenteric organisms. The question, therefore remains undecided.

[The importance of this paper is sufficient apology for the length of the above abstract.]

A. D. B.

GOLDBERGER (Joseph). **A Study of the Relation of Family Income and other Economic Factors to Pellagra Incidence in Seven Cotton-Mill Villages of South Carolina in 1916.**—*Public Health Rep.* 1920. Nov. 12. Vol. 35. No. 46. pp. 2673-2714.

The author gives the following summary and conclusions:—

"1. In the present paper are reported the results of the part of the pellagra study of cotton-mill villages, during 1916, dealing with the relation of conditions of an economic nature to the incidence of pellagra. It is the first reported study in which the degree of the long-recognized association between poverty and pellagra incidence is measured in a definite, purely objective manner.

"2. The study was made among the white mill-operatives' households in seven typical cotton-mill villages in South Carolina. Pellagra incidence was determined by a systematic, bi-weekly house-to-house canvas and search for cases, only active cases being considered. Information relating to household food supply, family income, etc., was secured by enumerators for a sample section of the period April 16 to June 15, assumed to be representative of the season during which the factors favouring the production of pellagra were assumed to be most effective.

"3. Family income was made the basis of classification according to economic status, the Atwater scale for food requirements being used for computing the size of families in comparing their incomes.

"4. In general, pellagra incidence was found to vary inversely according to family income. As the income fell, the incidence of the disease rose and showed an increasing tendency to affect members of the same family; as the income rose, the incidence fell, being reduced almost to the point of

practical disappearance in the highest of our income classes, although the income enjoyed by this class was comparatively low.

" 5. The inverse correlation between pellagra incidence and family income depended on the unfavourable effect of low income on the character of the diet; but family income was not the sole factor determining the character of the household diet.

" 6. Differences in incidence among households of the same income class are attributable to the operation of such factors as tend to determine the amount and proportion of family income available for the purchase of food, the intelligence and ability of the housewife in utilising the available family income, and to the differences among households with respect to availability of food supplies from such sources as home-owned cows, poultry, gardens, etc.

" 7. Differences in incidence among villages whose constituent households are economically similar, are attributable to differences among them in availability of food supplies resulting from differences (a) in the character of the local markets, (b) in the produce from adjacent farm territory, and (c) in marketing conditions.

" 8. The most potent factors influencing pellagra incidence in the villages studied were (a) low family income, and unfavourable conditions regarding the availability of food supplies, suggesting that under the conditions obtaining in some of the villages in the spring of 1916 many families were without sufficient income to enable them to procure an adequate diet, and that improvement in food availability (particularly of milk and fresh meat) is urgently needed in such localities."

A. D. B.

BORY (Louis). **Contribution à l'étude de l'origine de la pellagre.**—*Progrès Méd.* Paris. 1920. Oct. 23. Vol. 35. No. 43. pp. 461-462.

The author has seen two possible cases of pellagra and describes them in more or less detail. A brief résumé of pellagra etiology is given and the opinion propounded that in one of the cases cited infection was the most probable cause.

A. D. B.

FINDLAY (G. Marshall). **A Study of the Leucocyte Changes in Pellagra compared with those occurring in Beri-beri.**—*Jl. Path. & Bact.* 1920. Dec. Vol. 23. No. 4. pp. 490-498.

The author draws the following conclusions:—

" (1) In pellagra there is a slight increase in the total, but a decrease in the percentage neutrophil count.

" (2) In beri-beri there is a decrease in the total, but not in the percentage neutrophil count.

" (3) In pellagra there is an increase both in the total and percentage lymphocyte count.

" (4) In beri-beri there is a decrease in the total, but not in the percentage lymphocyte count."

A. D. B.

DE KOCK (P. J.) & BONNE (C.). **Pellagra in Suriname.**—*Nederl. Tijdschr. v. Geneesk.* 1920. Sept. 11. Vol. 64. Pt. 2. No. 11. pp. 965-972. With 1 double plate.

The author describes two cases of pellagra occurring in Surinam.

Case 1. Mulattin, aged 70. Symptoms present were sore mouth, salivation, cachexia, pigmentation on hands, feet, face and vulva, slight fever and mental changes. She died five months after admission to hospital.

Post mortem examination revealed pulmonary gangrene, perisplenitis and hepatitis, small haemorrhages in the upper part of the ileum and cyst-like growths in the colon.

Case 2. Male of European descent, aged 40. During first hospital admission was diagnosed as facial erysipelas. Re-admitted later with pellagrous eruption on face, hands and forearms. The patient was nervous, debilitated, sleepless and suffered from constant abdominal pain. Intractable diarrhoea set in which continued till his death. There was no post mortem.

The first asylum case of pellagra in the district was diagnosed in 1915. Since then ten cases have been recorded. The authors are of the opinion that many more cases exist but have not been diagnosed. They lean to the food deficiency theory of the disease.

A. D. B.

MACKAY (Malcolm). **Two Cases of Pellagra in Canada.**—*Canadian Med. Assoc. Jl.* 1921. Jan. Vol. 11. No. 1. pp. 41–42. With 2 text figs.

The author states that in Canadian literature he can only discover two cases of pellagra; both occurred in 1916. He gives an account of two more cases.

Case 1. Married woman, aged 21. Lived in England till August, 1919, when she came to Canada; Sept., 1919, delivered of a normal child. She had always been a small eater, but had never partaken of maize in any form. Occasional attacks of diarrhoea without skin lesions. Present illness began in February 1920 with weakness, headache, indigestion, diarrhoea; later, marked stomatitis. Stools contained pus and mucus. The rash was typical. The knee jerks were absent on both sides as were also the abdominal reflexes except in the left upper segments. The blood pressure was low and there was a running temperature for a time. The finger and toe nails were discoloured and loose. Patient gradually improved on Goldberger's diet and arsenic. Discharged well on October 22, 1920.

Case 2. Married woman. Aged 42. Always lived in Canada. Appetite was never good, but corn was only rarely eaten. For several years suffered from headache, indigestion and depression. For some months the mouth had been sore. Early in the summer of 1920 symmetrical erythema appeared on the arms, followed later by diarrhoea with blood and mucus in the stools. In September dizziness set in and a little later weakness, especially down the left side. The rash and stomatitis were typical. The case was complicated by carcinoma uteri, and though kept upon Goldberger's diet, she died on October 10, 1920, in a comatose condition.

A. D. B.

STRASSBERG (Maximilian). **Versuche zur Behandlung der Pellagra mit Eigenserum.** [Experiments on the Treatment of Pellagra with Auto-Serum].—*Wien. Klin. Woch.* 1921. Apr. 7. Vol. 34. No. 14. pp. 162–163.

Previous workers have shown that toxic maize extracts can be neutralized by the addition of the serum of patients recovered from pellagra. Such a protected maize extract is harmless when injected into rabbits, whereas animals treated with toxic maize extracts alone usually died. Ordinary human serum did not give this protective power. It has also been shown that rabbits treated with the toxic maize extract previously neutralized with the serum of convalescent pellagrins showed an increased resistance to that extract. Other

observers have not been able to confirm these results. COLE obtained good results with blood transfusion in pellagrins but could not satisfy himself that better results were obtained when convalescent pellagrins were the donors.

In the author's experiments 20-40 cc. of blood were taken from a series of pellagra patients. The resulting serum (10-17 cc.) was injected into the pellagra patient, usually intra-gluteally but sometimes subcutaneously. This was repeated every three or four days. On the average, patients received three to six such injections, but one received eight. Only typical pellagra cases were used. Out of sixteen patients treated on these lines eight lost the rash and other complaints after three to six injections, four cases recovered after three to eight injections; two cases were refractory and in two the treatment could not be continued. The author stated that normally it takes months for pellagra symptoms to disappear and that therefore his results are satisfactory. Owing to his departure from the scene of the experiments the author was unable to discover whether the symptoms returned.

A. D. B.

SULLIVAN (M. X.), STANTON (R. E.) & DAWSON (P. R.). **Metabolism in Pellagra; A Study of the Urine.**—*Arch. Intern. Med.* 1921. Apr. Vol. 27. No. 4. pp. 387-405.

"The study of the urine in pellagra at the U.S. Pellagra Hospital in 1917 may be summarized as follows:

"(1) The mineral metabolism seemed to be abnormal, especially in the actively pellagrous stage, as witnessed by the low P_2O_5 excretion despite the fact that the diet taken at the time was a generous one with abundance of milk.

"(2) Indications were present of a heightened putrefactive process in the intestines.

"(3) The presence of casts or albumin, or both casts and albumin, in the urine, gave evidence of more or less kidney change in about 50 per cent. of the cases. Marked pellagra can occur with no evidence of kidney change.

"(4) There was low excretion of total nitrogen and the ordinary urinary ingredients.

"(5) The urea ratio, in general, was low, and in certain cases with fair total nitrogen, the urea ratio was lower than should be expected: a finding which suggests liver insufficiency.

"(6) There was a heightened ratio for ammonia nitrogen and undetermined nitrogen.

"(7) The metabolic level during the active stage of the disease was low, as further shown by the low excretion of uric acid and creatinin.

"(8) The creatinin coefficient was much below normal.

"(9) The utilization of protein was found to be subnormal, even after several weeks of a remedial diet.

"(10) With at least a month on the curative diet, the urinary ingredients rose to approximately normal amounts, the urea ratio rose to normal and the ammonia ratio fell to normal.

"(11) As suggested by Goldberger, Wheeler and Sydenstricker, the disease may be differentiated into at least two types: (i) A type with marked skin symptoms, but with little physical degeneration; and (ii) a type with slight skin symptoms, but with profound systemic involvement. The abnormality in the urinary findings was greater for the systemic type than for the dermal type."

A. D. B.

SULLIVAN (M. X.). **Alkali Tolerance in Pellagra.**—*Jl. Amer. Med. Assoc.* 1921. Apr. 9. Vol. 76. No. 15. pp. 1002-1003.

The author draws the following conclusions :—

"The data on venous carbon dioxid tension and alkali tolerance of the pellagra patients at the Pellagra Hospital in 1920 support the findings obtained with more marked cases of pellagra in 1918 and 1919 by the venous carbon dioxid tension method and by the carbon dioxid bound by the blood plasma, that, as a rule, the alkali serve [reserve] in pellagra, though tending somewhat downwards, is within normal limits. Of fifteen patients tested, only four showed an increase in tolerance to sodium bicarbonate. Of these four patients, only two showed a marked tolerance, and these two patients had a severe diarrhoea."

A. D. B.

UNDULANT FEVER.

BASSETT-SMITH (P. W.). **Para-Melitensis Infection in Man and Animals.**—*Jl. Trop. Med. & Hyg.* 1921. Mar. 1. Vol. 24. No. 5. pp. 53-54. With 2 charts in text.

Working with a strain of *M. para-melitensis* obtained from NICOLLE, Bassett-Smith found that it showed much more definite bacillary forms than freshly isolated *M. melitensis*, that it was more easily agglutinated by non-specific sera and also more auto-agglutinable. Immunization of rabbits with this strain was more difficult than with *M. melitensis* and the agglutination curve obtained was usually low. Group agglutinins for *M. melitensis* in the para-melitensis serum were more marked than were similar agglutinins for *M. para-melitensis* in the melitensis serum.

The following technique is recommended for the agglutination test : "Take sufficient serum and divide this into two parts, heat one in the water bath at 37°C. for half an hour. Use a 48-hour growth of a reliable culture to make the emulsion, with or without formalin ; put up three dilutions of each serum, 1 : 40, 1 : 100, 1 : 400, and place in the incubator at 37°C. for two hours, and then stand in the cold and read off in twenty-four hours." Controls with normal and specific sera should be put up at the same time.

Details of four of the author's cases of para-melitensis infection in man are given, the disease having been contracted in southern Europe in every instance. One case was practically convalescent when first seen—another proved fatal as the result of a secondary streptococcal infection. Another made a good recovery while under treatment with the appropriate vaccine. The fourth died after receiving five injections of para-melitensis vaccine (initial dose 250 millions), to which the reactions were very severe and accompanied by an intense purpura ; old endocardial lesions were present and complicated the findings but a local necrosis at the site of injection was caused, and the author suggests that with para-melitensis infection there is an increased danger of secondary infections both in man and in animals.

W. Byam.

BASSETT-SMITH (Percy W.). **Undulant Fever.**—*Jl. Trop. Med. & Hyg.* 1921. July 1. Vol. 24. No. 13. pp. 173-176. With 2 charts in text.

The author notes as an important factor in the epidemiology the extension of the disease to districts far from the sea, such as Central Africa and Texas. He classes the cases as ambulant without symptoms, mild fevers lasting about 14 days (often unrecognized), long-continued remittent fever lasting about four months, and an intermittent type which led to the use of the term Mediterranean phthisis : this, which often follows the remittent type, appears to be common in South Africa. He refers in some detail to the effects on the nervous system. The author now generally uses a sensitized vaccine, but withholds it when the temperature is very high. During the war he feared a fresh development of the fever, but in the Navy there were in the five years only 63 cases. He details the laboratory methods of diagnosis he employs, giving his technique :—

"The most certain is the isolation of the micrococcus from the blood ; I prefer to do this in the afternoon during a pyrexial wave ; 10 cc. of

blood should be drawn off, divided into broth tubes and subcultured every day; a successful culture appears as minute dew-like colonies in 72 hours; or the following method may be used: Take 1 cc. of blood, allow to clot, remove serum with bactericidal substance and substitute broth, on two or three consecutive days; by this means successful cultures have been made when others failed."

A. G. B.

LUGER (Alfred). **Zur Differentialdiagnose des Maltafiebers.** [Differential Diagnosis of Undulant Fever.]—*Deut. Med. Woch.* 1921. Mar. 24. Vol. 47. No. 12. pp. 321-322.

The author's observations were made at Smyrna in 1918. He found that the differential diagnosis had to be made not only from paratyphoid and coli infections, but also from typhoid, sepsis, tubercle, malaria, liver abscess, rheumatism and other forms of specific arthritis.

He notes that in one case of his own, liver abscess had been diagnosed, but the local symptoms and blood examinations should generally separate the diseases. He particularly refers to the lymphocytosis and leucopenia in undulant fever. For malaria he refers to the colour of the skin: in undulant fever this is pale and anaemic, whereas in malaria it has a brownish yellow tint. Greater difficulties are found with paratyphoid infections as the pulse and blood pictures are similar; in coli infections the lagging of the pulse behind the temperature is not found as in typhoid and undulant fever.

With regard to agglutination tests these were very uncertain; he emphasises the importance of using young cultures which have been well attested, careful controls, and the macroscopic method. He used three strains from the Krall laboratory; one with normal and immune serum gave three times the titre of the other two. Among normal sera and that of other diseases he found positive agglutination in more than half of the cases, as a rule in 1/20 to 1/100, and in some febrile conditions as high as 1/800. The method thus carried out seemed impossible to apply, but by using heated sera (57°C for half an hour) as recommended by NÈGRE and RAYNAUD, the method has again become valuable. The non-specific agglutinins are markedly unstable to long storage and heat of 56°C, reducing those of normal sera almost to nothing, but it also cut down the titre of the specific sera. A high agglutinating serum after heating still retained a titre of 1/200 and remained evident, but if originally low it may be still further reduced. The author considers that in spite of this reduction in titre by heating, the method is indispensable and the most reliable. In chronic cases agglutinins may entirely disappear, and he quotes a case [the same is the experience of the reviewer], but in the majority of instances the method is sound.

For prognosis, the height of the titre gives doubtful results; a low one in acute cases is most important, but in slight cases it has no meaning. High agglutinins are not a safeguard for a favourable prognosis. He remarks that those working with these organisms should for safety use formalin emulsions. He requires an agglutination titre of from 1/200 to 1/400 for diagnosis. [There are many debatable points in this paper, but generally the views coincide with those of other well known workers. It is advisable always to put the test up with both heated and unheated serum, using positive and negative controls, and in titres of 1/40, 1/100 and 1/400.]

P. W. Bassett-Smith.

MEYER (Jean). **Mélicococcie par contamination de laboratoire.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris*. 1921. May 19. 3rd Ser. Vol. 45. No. 16. pp. 701-705. With 1 chart.

The patient is stated to have broken a tube containing a culture of *M. melitensis* in his pocket, and in spite of all precautions became infected. The important points are, the long incubation period, more than forty days, and the mildness of the disease, which presented six undulations of pyrexia and lasted two months. It is interesting to note that the onset was coincident with the presence of influenza in the family and that when laboratory tests were carried out on the fifteenth day they were negative for undulant fever, but positive on the last day of the sickness up to a titre of 1/400 with unheated, and 1/200 with heated serum. The strain itself had been in the laboratory since 1911 and had possibly become attenuated in virulence. Four other cases of laboratory infections with long incubation periods are mentioned, and the great danger of working with these cultures is emphasized.

[From the chart it appears that neither the commencement nor end of the disease are shown; probably the real onset was earlier than given and the incubation period much less than 40 days. Long latent periods are well known to exist before the patient is notified as being ill.]

P. W. B-S.

- i. DARGEIN & PLAZY. **Sur un cas de "fièvre méditerranéenne."**—*Bull. et Mém. Soc. Méd. des Hôpit. de Paris*. 1921. June 2. 3rd Ser. Vol. 45. No. 18. pp. 781-784. With 3 charts in text.
- ii. ——. **Sur une forme "atypique" de fièvre méditerranéenne.**—*Ibid.* pp. 784-786. With 3 charts in text.

i. The patient, aged 36, disembarked in March 1920 at Toulon, where he probably contracted the disease. He went to Rocheford suffering from fever and sweats and returned to Toulon at the end of April for treatment in hospital as a case of typhoid. Blood tests gave a positive agglutination with *Micrococcus melitensis* to a titre of 1/1000. The symptoms were distinct, with an irregular type of fever curve running into the intermittent chronic form. The duration was four and a half months and convalescence was incomplete [arthritis was still present]. The blood counts were interesting: at the commencement of treatment the red cells were 3,116,000, they fell to 1,800,000 and rose again at the end to 4,250,000, the white cells at the same time being 7,200, 5,200, and 4,500 with always a low relative polynuclear count. He was treated with vaccines without apparent benefit. No definite source of origin of the infection could be traced.

ii. A man of 29 working at the arsenal at Toulon was sent to the hospital for "gastric fever;" there his case was finally diagnosed as one of undulant fever, but the persistence of diarrhoea for a long period with gastric symptoms was peculiar. Blood cultures and serum tests for the typhoid group gave negative results, but the fever curve and severe sweats suggested a melitensis infection, and a laboratory test confirmed this. Vaccine treatment (10-60 millions) gave rise to considerable reactions, but did not appear to be very useful. The duration of the disease was three and a half months. The infection was attributed to eating goats' milk cheese, which is much used at Toulon and is often soaked in fresh goats' milk by the vendor to make it look

better before sale. It was noted that all the other members of the family had escaped the infection. It is probable that undulant fever is much more common at Toulon than is reported, as the irregularity of the fever renders the diagnosis very difficult or impossible without laboratory methods.

P. W. B-S.

ROZIES (H.). **Les formes graves de la fièvre de Malte.**—*Progrès Méd.*, 1920. Dec. 25. No. 52. pp. 563-565.

The author points out that though the mortality from undulant fever is low (2 per cent.) in naval and military forces, among the civil population affected it is very much higher, 13 or more per cent., and that it is far from being a benign fever. This is chiefly due to severe complications. He instances a case of two months duration accompanied by epistaxis and intestinal haemorrhages, with intense asthenia. Cases with purpura are particularly dangerous.

The severe forms he divides into hyperpyrexial, ataxo-adyamic, haemorrhagic and persistent (*formes interminables*). The associated diseases which increase the morbidity are, malaria, tubercle, typhoid and paratyphoid. The indications for treatment of severe cases are—control the infection by colloidal therapy and vaccine therapy, treat the complications, and maintain the general nutrition.

[A fatal case of para-melitensis infection with extensive purpura reported by BASSETT-SMITH is an instance confirmatory of the danger of these haemorrhagic conditions.]

P. W. B-S.

DAUMAS (A.). **De l'examen du réticulum fibrineux dans la fièvre de Malte.**—*C.R. Soc. Biol.* 1921. Vol. 84. No. 4. pp. 215-216.

The early appearance of an increase of fibrin threads in the blood of two cases of undulant fever is brought forward as a possible early diagnostic sign in differentiation of these cases from those of an enteric nature. The author also noted the high relative lymphocyte counts and rather late appearance of specific agglutinins for the *melitensis* organism, negative on third and ninth day, positive 1-40 on twelfth and 1-2,000 on thirtieth, in one case; negative on fifth, positive 1-20 on tenth, 1-300 on twentieth, and 1-1,500 on fortieth, in the second.

P. W. B-S.

PRINGAULT (E.). **Valeur de la séro-réaction de Wright.**—*C.R. Soc. Biol.* 1921. Jan. 8. Vol. 84. No. 1. pp. 53-55.

The sera of 163 cases other than undulant fever were tested with three strains of *M. melitensis*, following the technique recommended by NICOLLE. With fresh unheated sera, positive results were obtained in dilutions varying from 1-30 to 1-150. With heated sera no agglutinins were found in dilutions greater than 1-100. The author concludes that the reaction has real value provided that:—

- (1). A well attested culture is used;
- (2). The emulsion is made from at least three strains of *M. melitensis*;
- (3). The serum to be tested is heated to 56°C. for half an hour.
- (4). A positive result should only be returned when agglutination takes place in dilutions of 1-250 or over.

[This would miss many *chronic* cases, as in these the agglutinins are often very low].

P. W. B-S.

ZIEMANN (H.). Ueber die Behandlung des Maltafiebers und des infektiösen Abortes der Rinder mit Kollargol und ähnlichen Präparaten. [The Treatment of Undulant Fever and Abortus Infections of Cows by Collargol and Like Preparations].—*Deut. Med. Woch.* 1921. May 5. Vol. 47. No. 18. p. 500.

At a meeting of the Microbiological Society in Berlin in May 1920, ZELLER stated that he was unable by laboratory methods to determine any definite distinction between the causative agents of undulant fever of man and abortus infection of cattle, but it does not follow, however, that the two diseases are identical. The author at the meeting described two cases of undulant fever which had received, without benefit, many kinds of treatment and were cured by one or two intravenous injections of 2 to 4 cc. of a two per cent. solution of collargol. As he had no further cases of undulant fever he recommended that veterinary surgeons should give the agent a trial in the allied disease of cattle. It was probable that other metallic colloidal preparations might be found as effective. He quotes other cases where silver colloids had been used with benefit in undulant fever and, unlike SOULEYRE, thinks that these therapeutic agents have direct bactericidal action on the infecting organism.

P. W. B-S.

SOULEYRE (C.). Recherche d'une méthode de colloïdothérapie dans la fièvre méditerranéenne.—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1921. Feb. 25. 3rd Ser. Vol. 45. No. 6. pp. 176-184. With 5 charts in text.

In 1906 the author had considerable success in treating two cases of undulant fever with colloidal silver, 1-10 cc. of a one per cent. solution. He has followed this up in twelve other cases with good results and he now gives details of one case in which doses of 10 cc. of colloidal gold brought about a sudden fall in the temperature and a marked general improvement. In spite of this the patient had a slight relapse some weeks later, when two injections of 30 cc. of a specific serum from the Pasteur Institute of Algiers were given, which was followed by a permanent cure. He states that these colloidal preparations should not be used in very toxic or complicated cases, but in long moderately severe, sub-acute and chronic ones, without intense cachexia, the treatment is to be recommended. From a study of the cases he deduces the following points: "weak" metallic colloids, even in large doses injected intravenously, give unsatisfactory results. Strong metallic colloid (gold) in large doses will bring about a cure in uncomplicated cases. It is best to work up the dose gradually from 1 cc. to 10 cc. doubling the amount each day, and to guard against the depressant effects of the drug by an injection of oil of camphor or adrenalin, a short time before each intensive dose of the colloidal preparation is given.

[It must be remembered that the disease is apt to have sudden remissions of symptoms suggesting a "post hoc" action of any drug or vaccine given at the time, and great care is required to assess any special line of treatment at its correct value. The method is however one that should be thoroughly tried, bearing in mind the warnings as to unsuitable cases. No definite information is given as to which are "weak" and which are "strong" metallic colloids].

P. W. B-S.

NICOLLE (Charles) & CONSEIL (E.). **Vaccination préventive de l'homme contre la fièvre méditerranéenne.**—*C.R. Acad. Sci.* 1920. Oct. 26. Vol. 171. No. 17. pp. 775-777. With 1 chart.

By a human experiment the authors show that it is possible by subcutaneous inoculations of dead cultures of the *M. melitensis* to protect against contracting undulant fever. The data for the conclusions are however, small. Two persons received two doses of the protective inoculation; one did not. All three were inoculated subcutaneously with 0.5 cc. containing 450 millions of the living organisms which had been used for the immunization. The two previously inoculated did not develop any symptoms; the blood examined on 20th and 32nd day gave no growth by culture, nor showed any evidence of agglutinins, whereas the third case after 17 days incubation developed fever of a characteristic undulant type, showed agglutinins and a positive blood culture was obtained. The absence of agglutinins in the blood of the vaccinated after inoculation with the virulent culture, and their presence in the unprotected case, proves to the authors that the serum-agglutination reaction is a sign of infection and not of immunization.

The laboratory workers using the micrococcus could by this means be easily protected against accidental infections which are, as is well known, only too frequent.

P. W. B-S.

REVIEWS.

PENNA (José) & BARBIERI (Antonio). **El paludismo y su profilaxis en la Argentina.** Ministerio del Interior, Departamento Nacional de Higiene.—vii+390 pp. With 4 charts, 5 maps, 2 coloured plates and 53 illustrations in text. 1916. Buenos Aires: Establecimiento Gráfico. M. Rodriguez Giles, 434, Loria 444. [Price not stated.]

To more than half a million inhabitants of the fertile Argentine Republic malaria is an urgent problem both of economics and of health. This book is at once a record of the measures undertaken by the State Department of Health and an element in its campaign to rid the Argentine of malaria. The writers are convinced from their experience that material progress has been made, but as no statistics were recorded before 1910 it has not been possible to demonstrate graphically all that has been done. The following table of primary infections among the cases treated is, however, not without significance:—

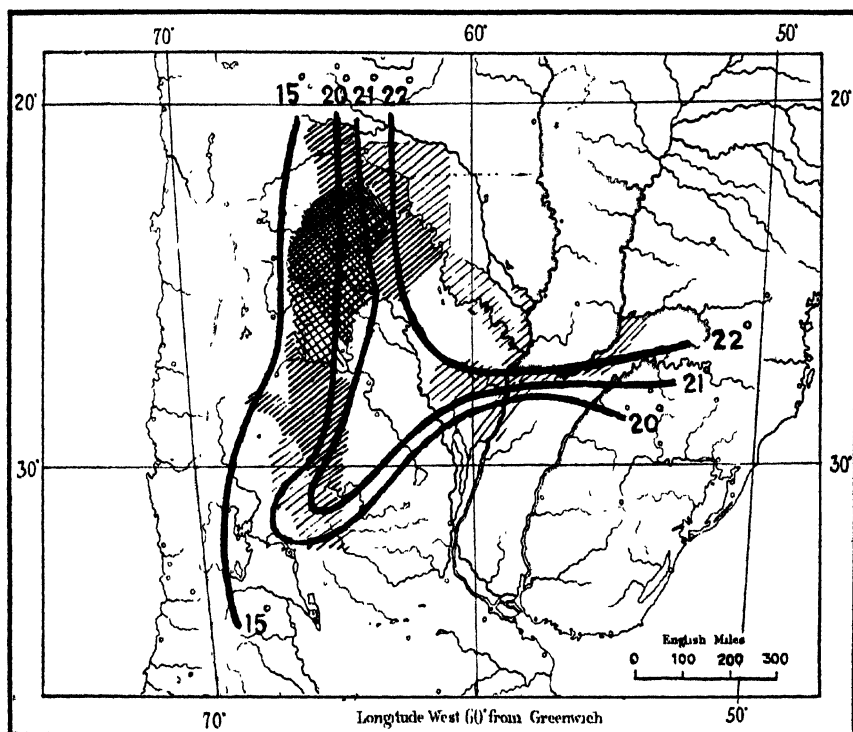
1910	primary infections	24.7	per cent of all cases treated.						
1912	"	"	26.1	"	"	"	"	"	"
1913	"	"	21.0	"	"	"	"	"	"
1914	"	"	14.4	"	"	"	"	"	"
1915	"	"	11.9	"	"	"	"	"	"

So much the authors point out in their preface. But reference to further statistical tables (pp. 70-71) shows that the total number of cases treated rose from 75,324 in 1912 to 162,825 in 1915. Obviously under these circumstances too much importance must not be attached to the relative incidence of primary infections and relapsing cases.

Malaria has been known in South America since histories of those peoples were first written. It was certainly endemic in the empire of the Incas at the time of the Spanish conquest, and the specification of chinchona bark was widely known amongst the conquered peoples. "The heat and humidity which made fertile the fields were fatal to the inhabitants," said Washington Irving in his life of Christopher Columbus (1851) and added, "the exhalations of the swamps and of the huge surrounding forests and the action of the sun on that vapourous soil produce European intermittent fevers in the uncultivated tropical regions." The Spanish historians describe epidemics in which the greater part of the population was wiped out. As for the origin of malaria in South America, the authors, after discussing untenable theories, conjecture that the disease travelled across the Pacific with those prehistoric explorers [Professor G. Elliott SMITH tells us that they followed the track of pearls and gold] who have left such unmistakable relics of a schooling in the earliest civilization of the East. There is no gainsaying the probability of this hypothesis. There follows a discussion of the present distribution of malaria in the Argentine, and the authors point to a relation between the intensity of infection and the isothermal lines. This coincidence is illustrated in the accompanying map. The argument is that certain temperatures are more favourable than others for the breeding and wide distribution of anopheles.

Chapter 5 is devoted to the irregular and pernicious forms of malaria amongst which is included *fiebre biliosa hemoglobinurica* or "blackwater-fever." The authors, while mentioning the theory favoured by CASTELLANI that this is a distinct disease of unknown aetiology, evidently themselves incline to the view that it is of malarial origin. It is, they say, only found in malarial districts and in the tropics where the aestivo-autumnal fever abounds. A good description is given of the clinical course of the disease. The differential diagnosis with paroxysmal haemoglobinuria of syphilitic origin is discussed, the conclusion being that the two conditions, for all their similarity, are aetiologically distinct and occur fortuitously in the same tropical areas. A good account is given in Chapter 6 of malaria in children. The writers find that infants at birth and during the period of lactation possess an immunity not to the parasite but against its toxin, for they have found haematozoa of the benign type in the blood of such infants in whom no symptoms or only a very slight pyrexia were to be observed. After the

first year infection becomes progressively more common, a fact which is explicable by the increasing exposure of the children to mosquito bites. The blood of children with slight fever should be regularly examined, for in early years malaria is liable to simulate tuberculosis, gastro-enteritis, influenza, epidemic meningitis, typhoid fever, pneumonia, leucaemia and other diseases. The typical symptoms of malaria, too, are liable to be wanting, for in the first two years sweating rarely occurs and when it does occur is limited to the head and forearms. Intestinal symptoms, tympanitis, pain, diarrhoea, etc., were found to be common. Among 1,022 children examined in the province of Salta, 291, or 28 per cent., were found with enlarged spleens.



ARGENTINE REPUBLIC. Isothermal Lines corresponding with Malarial Regions.
[After PENNA AND BARBIERI.]

Among the *Anopheles* found in the Argentine are mentioned *A. albicans*, *A. annulipalpis*, a relatively rare species, found on the border of the Rio de la Plata and south of Buenos Aires, but not in the northern provinces, and *A. pseudopunctipennis*, which is the mosquito responsible for most of the malaria in the northern provinces. Another malaria carrier is *Anopheles albimanus*, which is only distinguishable from *A. albicans* by a black ring round the first and last tarsus of the hind feet.

Thirty-five pages are devoted to the subject of quinine. The Department of Health made use of quinine prophylaxis both in treating chronic cases and distributing quinine amongst the healthy population. Both for convenience of distribution and for the conservation of the drug they preferred to use tablets. The tablets principally used were quinine hydrochloride 0.50 gm. and 0.25 gm., and for distribution among children "chocolatines" of quinine tannate. Formerly the distributors of quinine had been known as *amargos* (the bitter men), but with the introduction of these tablets, manufactured by Burroughs Wellcome, Park Davis, and Boehringer and Soehne of Germany, quinine became popular. The bottles

of tablets were accompanied by admirably designed instructions which are reproduced. The following table shows the amount of quinine distributed :

Year.	Patients.		Grammes of quinine hydrochloride.	
1909	30,235	..	240,150	
1910	31,892	..	372,897	
1912	55,324	..	446,491	
1913	128,587	..	817,985	
1914	175,875	..	1,032,924	
1915	165,478	..	870,308	

Quinine haemoglobinuria they describe as rare and only occurring in subjects with "congenital familial predisposition." They recommend subcutaneous injections of neutral hydrochloride of quinine in cases which need rapid treatment or in which there is gastric intolerance. Intravenous injections are considered the method of choice in all very acute or very chronic cases and especially in hospital cases. Salvarsan is used in cases which resist quinine treatment.

The distribution of quinine was only one of many methods of prophylaxis adopted in this very thorough campaign. In addition to fumigation, irrigation, oiling, etc., special attention was paid to popular instruction. The illustration from page 337 is a good example of poster work.

J. Rosslyn Earp.

LUSTIG (A.) & FRANCHETTI (A.). **Studi ed osservazioni sulla Pellagra. (Commissione Ministeriale per lo Studio della Pellagra).**
— Reprinted from *Lo Sperimentale*, 1921. July–December.
Vol. 75. Nos. 4–6). 96 pp. [1921. Firenze: Stab. Tipografico Enrico Ariani.]

This volume constitutes the report of a commission nominated by the Italian minister for home affairs in November 1910. The work of the Commission, interrupted by the war, was resumed after the armistice and is now completed. The war itself furnished them with what they consider their most important observation, namely, that during the period of hostilities when many infectious diseases, especially tuberculosis and malaria, showed a marked rise in morbidity, pellagra on the other hand diminished. They consider this important evidence in support of the theory that pellagra is a deficiency disease. This theory obtains further credit from the fact that during the war the diet of the rural populations was both richer and more varied than it had been formerly. The idea that an infection may be carried in certain foods is further discredited in that war conditions resulted in an unusual amount of transport of food-stuffs.

All the important theories of the aetiology of pellagra seem to have been investigated by the Commission, principally with negative results. Thus a sub-commission composed of Drs. ANTONINI and ALESSANDRINI working in haematology was unable to confirm the mononucleosis described by SAMBON. The Commission was also unable to establish any aetiological relation between the occurrence of pellagra and Simulium. Not only SAMBON's theory but also those of ALESSANDRINI and TIZZONI were investigated and definitely rejected by a majority of the Commission. As for the maize theories, it is agreed that cases of pellagra in subjects who do not eat maize are the exception rather than the rule, and the special research of the Sub-commission (Drs. STRAMBIO sen., MARZARI, Filippo LUSSANA) agrees with other modern work in attributing pellagra rather to a qualitative food deficiency than to an intoxication. The theory that an essential element is removed from maize in the milling is admitted to be attractive, but the writers point out that no specific anti-pellagra vitamin has been isolated from the rejected portion. But all the recent evidence supports the contention that pellagra is a nutritional disorder for which the excessive proportion of maize in the diet is largely responsible.

J. Rosslyn Earp.

TROPICAL DISEASES BUREAU.

TROPICAL DISEASES BULLETIN.

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[No. 4.

DYSENTERY: A REVIEW OF THE LITERATURE OF THE LAST SIX YEARS.

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INTRODUCTORY.

In the present review it is proposed to deal with the advances in our knowledge of the two main types of dysentery—the bacillary and the amoebic—during the period of hostilities and since the conclusion of peace.

For many reasons the present is an opportune moment; for it is only during the last few months that the stream of war-literature has slackened sufficiently to enable the reviewer to regard the whole subject in due perspective. It is no easy task that he has had to perform, and he would ask the indulgence of the reader in this attempt at summarizing what is indeed a very extensive and important subject.

Probably never in the world's history has the subject of dysentery attracted such widespread attention as under recent war conditions, nor has it ever before been possible to study the disease by modern methods amid circumstances so favourable.

To the vast majority of medical men on service the subject of dysentery proved to be entirely new. The literature was scattered throughout many journals in a peculiarly inaccessible form, nor could it be maintained that the disease was adequately treated in any modern text-book. Small wonder, therefore, that many of the older ideas upon its etiology were revived and many ancient fallacies repeated, but on the whole workers, more especially those in the British ranks, may be well satisfied with the very material advances achieved, which briefly are as follows :—

The organisms of *epidemic* or *bacillary dysentery* have been studied on a very extensive scale, their specific characteristics and many points regarding their life-history and their transference from man to man are better understood than formerly, and a more accurate idea of the pathology of the successive stages of the disease has been

obtained. In treatment the value of antiserum has been appraised on an unprecedented scale, and its application and limitations duly estimated. As regards prophylaxis, apart from sanitary measures, a system of preventive inoculation has been worked out and partially put into operation.

In *amoebiasis* a most notable advance has been the accurate morphological differentiation of the various amoebae parasitic in the intestine of man and a more accurate understanding of their life-histories. The question of treatment with the object of attaining a radical cure has proved to be a much more tedious and difficult matter than was formerly thought. Modified ideas of the value of emetine in the treatment of the disease have led to radical alterations in dosage and in methods of administration, and have resulted in the production of a much more powerful combination of the alkaloid with bismuth in emetine-bismuthous-iodide.

BACILLARY DYSENTERY.

1. *Epidemiology.*

Bacillary dysentery broke out as a war disease in almost every European and tropical theatre of hostilities. From German sources we have abundant evidence that it occurred, quite early in the war, in Prussia, as well as upon the Russian and Austrian fronts. Amongst the French forces it apparently simmered during the whole war. But in the British Army it attracted little attention till the autumn of 1916; from that time onwards it assumed quite important proportions, and gradually spreading, reached its maximum in 1918. Flexner's bacillus was responsible for the majority of cases; the death-rate appears to have been a very low one—considerably under 1 per cent.; its main importance lay in the large number of men it crippled.

Bacillary dysentery has long been recognized as occurring amongst the inmates of lunatic asylums in Great Britain and has broken out sporadically from time to time. In the autumn of 1917 BUCHANAN recorded an outbreak due to Shiga's bacillus amongst a body of workmen in England.

In the Dardanelles there appears to be little doubt now that the majority of casualties have to be ascribed to bacillary dysentery, although in the earlier part of this hazardous adventure there appears to have been, owing to lack of proper facilities, considerable divergence of opinion as to the correct diagnosis. In Salonika, Egypt and Palestine, bacillary dysentery was much in evidence, especially during the autumn months (October–November). The absence of this infection during the cooler winter and the hot summer months was generally noted. In semitropical countries epidemics of bacillary dysentery recur in definite seasonal waves. In Mesopotamia LEDINGHAM records that, as noted elsewhere, bacillary dysentery affected most commonly the front-line troops, and accounted for the great majority of "clinical dysenteries," and that, although the proportion of amoebic infections to the total stood higher than in other war zones, *B. dysenteriae* was responsible for 80 per cent. of the infections amongst British troops. In East Africa the occurrence of bacillary dysentery amongst the troops was recorded by PRIDE; here, too, Shiga's bacillus was responsible for the most virulent cases.

The case mortality-rate is difficult to compute; it was probably greater in the Dardanelles than elsewhere, but even at that period it is estimated at not exceeding 5 per cent.*

2. Bacteriology.

The scientific classification of the dysentery bacilli has undergone revision. There has been an attempt to reduce the number of types and strains by disregarding variations in bio-chemical reactions, and to rely more upon serological tests for systematic classification and identification.

Shiga's bacillus is generally recognized as the most typical organism, which apparently in all circumstances remains true to type. This bacillus was recognized as being responsible for the most severe and fulminating types of dysentery on all fronts. There is little doubt that in toxicity it exceeds the mannite-fermenting groups. It has been abundantly confirmed as the cause of dysentery by all known criteria. It has been found, by DOLD in China, to occur as a natural infection in dogs.

A motile bacillus resembling *Shiga's* in its sugar reactions, but forming indol, has been credited by SCHMITZ with the causation of dysentery. It is not agglutinated by *Shiga-immune* serum, but is clumped by MICHAELIS' acid agglutination test. This investigator claims that a graduated series of solutions of acetic acid with caustic soda, forming ascending hydrogen-ion concentrations, will agglutinate certain bacilli. The true *Shiga's* and *Flexner-Y* bacilli are not clumped in this fashion, but aberrant organisms—the so-called para- or pseudo-dysentery bacilli, to which SCHMITZ's organism belongs—apparently are. ANDREWES has described a similar organism as the *Bacillus ambiguus*, and in Salonika DUDGEON recognized paradysentery bacilli of two kinds, dubbed + and —, which apparently belong to the same category. The etiological importance of these bacilli can at best be considered doubtful.

The *Flexner* bacillus and the Y-strain of Hiss and Russell apparently belong to a single species. As in the case of *Shiga's* bacillus the evidence of its etiological significance is complete.

A large number of strains of *mannite-fermenting* organisms having been included as being closely allied to *Flexner's* bacillus, ANDREWES and INMAN have attempted to co-ordinate them on a serological basis.

* REFERENCES.

Dysentery in Germany.—MATTHES (M.), vol. 7, p. 212; SEIFFERT (G.) & NIEDIECK (O.), vol. 8, p. 130; MAYERHOFER (E.) & VON REUSS (A.), vol. 12, p. 16; ASCOLI (A.), vol. 12, p. 299.

In France.—LOYGUE (G.) & HAGUENAU (J.), vol. 11, p. 55; LANCELIN (R.) & RIDEAU (I.), vol. 12, p. 14; FLORAND, BEZANÇON & PARAF, vol. 12, p. 13.

In Russia.—MEYER (F.), vol. 9, p. 190; KOCH (J.), vol. 9, p. 437.

In Gallipoli.—ARCHIBALD (R. G.), HADFIELD (G.), LOGAN (W.) & CAMPBELL (W.), vol. 8, p. 378.

In England.—BUCHANAN (G. S.), vol. 12, p. 295.

In Salonica.—DUDGEON (L.), vol. 15, p. 194.

In Egypt and Palestine.—MANSON-BAHR (P.), vol. 16, p. 10.

In East Africa.—PIRIE (J. H. H.), vol. 9, p. 426.

In Mesopotamia.—LEDINGHAM (J. C. G.), vol. 17, p. 31.

N.B.—All references are to the summaries in this *Bulletin* unless otherwise stated.

From their work it appears that five definite strains may be recognized, termed V, W, X, Y, Z, for the recognition of which they have prepared five homologous sera. Their object has been to provide a pooled serum of these five components for the laboratory identification of Flexner's bacillus.

Certain *lactose-fermenting* strains have been connected with dysentery. Certain cultures of Flexner-Y organisms have been found to ferment lactose and to produce dysenteric lesions when injected into rabbits. In these organisms the lactose-fermenting properties are permanent, and it is possible that further investigations of this problem will show that the lactose employed in these tests may have been of doubtful purity.

The *atypical* or *inagglutinable* dysentery strains may be dismissed from consideration.

Several observers have recorded the isolation of the dysentery bacillus from the blood by culture during life or from the solid organs after death. GHON and ROMAN, and FLU record blood-culture of *B. dysenteriae* "Y" in two cases with typhoidal symptoms; in LEDINGHAM and PENFOLD's case the organism was Shiga's bacillus. DUDGEON in Salonika isolated Flexner's bacillus from the blood of two acute dysentery cases, but in 143 similar instances the result was negative.

In the preparation of efficient antisera, both for curative purposes and for agglutination, NICOLLE and his co-workers have recorded that, for the production of the former, extracts of the bacilli are more satisfactory, while for the latter the bacilli themselves should be used.

According to BUJWID the serum of normal horses will agglutinate both the Shiga and the Flexner bacillus in fairly high dilutions (1 : 200). FLEXNER states that, owing to the great demand for antisera, he found it more advantageous to discard the old-established method of subcutaneous injections into the horse and to substitute repeated intravenous injections for short periods with intervals of rest, and by this means he was able to produce a serum of high protective value in about ten weeks.*

3. Pathology.

Singularly little has been written upon the pathological aspects of this extremely variable disease.

BAHR has noted that death may occur within 56 hours from the onset of symptoms, and that in these cases the appearance of the cadaver

* REFERENCES.

Occurrence of bacillus in dogs.—DOLD (H.), vol. 9, p. 435; DOLD (H.) & FISCHER (W.), vol. 17, p. 174.

Occurrence of bacillus in blood.—GHON (A.) & ROMAN (B.), vol. 6, p. 457; LEDINGHAM (J. C. G.) & PENFOLD (W. J.), vol. 7, p. 228; FLU (P. C.), vol. 9, p. 434; DUDGEON (L. S.), vol. 15, p. 194.

Biochemical reactions.—MARTIN (C. J.) & WILLIAMS (F. E.), vol. 10, p. 143; MICHAELIS (L.), vol. 11, p. 263.

General.—ANDREWES (F. W.), vol. 12, p. 16, and vol. 16, p. 14; ANDREWES (F. W.) & INMAN (A. C.), vol. 16, p. 14; SCHMITZ (K. E. F.), vol. 12, p. 306; MURRAY (E. G. D.), vol. 13, p. 229; MACKIE (T. J.), vol. 14, p. 99; DUDGEON (L. S.), vol. 15, p. 194; HIRSCHBRUCH & THIEM (H.), vol. 14, p. 107.

Preparation of antiserum.—BUJWID (O.), vol. 7, p. 218; NICOLLE (M.), DEBAINS (E.) & LOISEAU (G.), vol. 8, p. 446; FLEXNER (S.), vol. 8, p. 453.

may suggest an intense toxæmia. A general lymphoid peritonitis may be present, with oedema of the mesentery. The lower part of the ileum, as well as the whole of the large gut, may be intensely engorged; the mesenteric glands enlarged and diffuent. In these cases, too, the spleen is dark red and pulpy. When the disease is fully developed the mucous membrane of the large gut and exceptionally—in one case—the whole of the small intestine, undergo *colliquative necrosis*. In cases in which life is prolonged beyond this stage the necrotic tissue is desquamated and repair of the gut takes place by formation of granulation tissue. In a bowel which has undergone such extensive destruction it is doubtful whether the mucosa can be completely regenerated.

Opportunities of observing the chronic stages of bacillary infection have been extensive. Ragged ulcers form in the large bowel. The individual lesions vary considerably in size, rarely penetrate the *muscularis mucosae*, and consequently perforation of the peritoneum seldom takes place. In these chronic conditions the bacillus may be isolated with considerable difficulty by cultural methods from the bases of the ulcers.

BAHR has noted that mucous retention cysts, which may attain quite noticeable proportions, may arise as the direct sequel of chronic bacillary dysentery. Their formation is possibly due to pseudo-adenomata springing from the fundi of Lieberkühn's glands. A polypoid condition of the mucous surface may also be another direct sequel; the polyps themselves, outgrowths of varying length, being composed of very vascular granulation tissue.

As regards the histopathology of bacillary dysentery, BAHR and WILLMORE have found that the macrophage cells which constitute such a striking feature of the cellular exudate in the stools are produced by proliferation of the capillary endothelium of the submucosal vessels.*

4. *Symptomatology.*

The general symptoms of bacillary dysentery present infinite variation; it is now recognized that all degrees of severity of infection may occur. It may manifest itself as a diarrhoea of a few days' duration, and the abdominal symptoms may be hardly noticeable; these mild cases are generally due to Flexner-Y bacilli. On the other hand, choleraic cases leading to a fatal result in two or three days have been noted, and may possibly lead to confusion with true Asiatic cholera. The fulminating cases are sufficiently characteristic, but in the milder types it is practically impossible, on clinical data alone, to differentiate between bacillary and amoebic infections. An intermittent pyrexia may accompany the initial stages, and the toxæmia may at first sight actually suggest an enteric infection. The stools, which are numerous and small in quantity, are formed of gelatinous and viscous blood-stained mucus. It has been remarked that these characteristics, added to their inoffensive nature, serve to distinguish them from the stools of the amoebic disease.

The *complications* of bacillary dysentery have received widespread attention: of these dysenteric *arthritis* is the most striking and severe. The knee is most commonly affected, though the implication of other

* REFERENCES.

BAHR (P.) & WILLMORE (J. G.), vol. 13, p. 243; MANSON-BAHR (P.), vol. 16, p. 10.

joints, such as the ankle, hip, metacarpophalangeal, metatarsal, and temporo-maxillary have been noted. Arthritis generally supervenes during convalescence, or rather when the more acute dysenteric symptoms have subsided. The effusion into the joint cavity takes place suddenly and is accompanied by pyrexia, though there is no evidence to show that the damage to the articulation may be permanent. The synovial fluid in these cases is straw-coloured and, generally speaking, sterile on culture. It is recorded by DUDGEON that in one instance Shiga's bacillus was isolated by ELWORTHY. According to KLEIN this fluid possesses considerable power of agglutinating the homologous dysentery organism, the titre of agglutination being equal to that of the blood-serum of the case at the same time.

Iridocyclitis may supervene in association with arthritis or as an independent condition during convalescence. It is apparently only found in Shiga infections.

A specific *dysenteric conjunctivitis* has been noted on the western front by COSSE and DELORD, as well as by GRAHAM in Malta. It supervenes about the tenth day of the illness onwards.

Chronic bacillary dysentery patients, STRASBURGER notes, are generally extraordinarily pallid and cachectic; sometimes they are oedematous; this cachexia may be ascribed to chronic absorption of dysenteric toxins.*

5. Diagnosis.

The rapid diagnosis of bacillary dysentery is a very important subject from a military and therapeutic standpoint, and has naturally attracted much attention.

WILLMORE and SHEARMAN have emphasized a point never before sufficiently realized, that a rapid and correct diagnosis may be made in the *early stages* of the disease by a simple microscopic examination of the stool and a study of the cellular exudate. The characteristics of the bacillary stool are the abundance of polymorphonuclear leucocytes with large ring-like nuclei; these preponderate over the mononuclears, and form fully 90 per cent. of the cells of the exudate.

The presence of large hyaline macrophage cells, which constitute about 2 per cent. of the white cells in the stool, has led to considerable confusion, as they are capable of ingesting leucocytes and red blood cells, and thus bear a very close resemblance to *Entamoeba histolytica*. In diameter these macrophages measure 20μ to 30μ ; they may be oval, round, or even bilobed in shape. It is thought that they are derived from the capillary endothelium of the gut-wall.

A diagnosis based upon the isolation of the bacillus from the stools is by far the most satisfactory method; this depends to a great extent upon observing niceties of technique. In the first instance the stool must be freshly passed, for even a few hour's delay in a warm climate

* REFERENCES.

Symptoms:—General.—JACOB (L.), vol. 10, p. 139; RYLE (J.), vol. 14, p. 100; STRASBURGER (J.), vol. 18, p. 42.

Complications.—RIST (S.), vol. 9, p. 441; CROUZON (O.), vol. 9, p. 441; MOREAU (L.), vol. 9, p. 442; KLEIN (B. G.), vol. 15, p. 202; MANSON-BAHR (P.), vol. 17, p. 16; GRAHAM (G.), *Proc. Roy. Soc. Med.* (Sect. of Med.), 1919, pp. 23-42; COSSE & DELORD, vol. 13, p. 235.

may prejudice the chances of culture of this delicate organism (WHITEHEAD and KIRKPATRICK; MARTIN and WILLIAMS). The chances of successful isolation are much more favourable during the earlier stages of the disease; thus the latter observers have shown that out of 1,050 attempts to recover dysentery bacilli at various periods of the disease, 68 per cent. of positive results were obtained in the first five days, 17·4 per cent. in the second five days, and 6·3 per cent. in the third five days.

DUDGEON and his co-workers in Salonika have shown that organisms of the dysentery group are sensitive to the presence of free acid, while they are able to grow freely in an alkaline medium. An equal quantity of 3 per cent. normal soda should therefore be added to a dysentery stool when it is necessary to send the specimen some distance to the laboratory; under these conditions the bacillus may be isolated even after a delay of twelve hours. A method of preserving faeces for delayed examination has also been introduced by TEAGUE and CLURMAN (Medical Research Council. Special Report Series, No. 51) by emulsifying with double volume of 30 per cent. glycerine in 0·6 per cent. saline. This procedure prevents the dysentery bacilli from being overgrown by coliform organisms.

As regards the medium most suitable for the growth of dysentery bacilli, considerable diversity of opinion would seem to exist. The majority prefer the original MACCONKEY medium, though others find the addition of the inhibitory sodium taurocholate to be unnecessary, and obtain better results with plain litmus-lactose agar. LEVINE, working in the laboratories of the American Expeditionary Force, has evolved a medium in which china-blue rosolic acid is used as an indicator. The composition of the medium is as follows:—

Distilled water	..	..	..	..	1,000 cc.
Agar	..	..	..	..	15 gm.
Peptone	..	..	..	..	10 gm.
Dipotassium sulphate	..	..	..	..	4 gm.

To each 100 cc. of the melted medium is added before use:—

Lactose 20 per cent. solution	..	..	5 cc.
Glucose 5 per cent. solution	..	..	1 cc.
Rosolic acid (1 per cent. in 90 per cent. alcohol).			1 cc.
China-blue (0·5 per cent. in water)	..		1 cc.

The recognition of the dysentery colonies on the plate can be rapidly confirmed by macroscopic agglutination, for which a suitable polyvalent serum embracing the five serological types of Flexner-Y, together with a Shiga serum, should be employed. If tubes are used it is recommended that the time allowed should be at least four hours at 55° C., but the reaction will not be complete till ten hours later. The addition of 0·1 per cent. formalin to a broth culture minimizes both spontaneous and group agglutination. If very rapid confirmation is desired, macroscopic agglutination readily takes place on the glass slab of Garrow's agglutinometer. For complete diagnosis the organism should be planted out in four sugar media, viz., glucose, lactose, mannite and dulcitate.

Sero-diagnosis.—This method has its limitations, but it is useful, especially in convalescent cases. The technique recommended by DREYER, both on account of its greater sensitiveness and because of

the standardization, gives the most reliable results. In the case of Shiga dysentery it may be said that these results have been consistent, but in the case of Flexner-Y they have been less encouraging, probably owing to the existence of five serological races of this bacillus. Much has been made by RITCHIE and others of the tendency of certain normal sera to agglutinate the dysentery bacillus; possibly this tendency has been over-estimated. In Shiga infections a positive diagnosis should be established by an agglutination of 1 : 25, in Flexner-Y dysentery it would not be advisable to consider this rather low dilution a certain indication. In summing up the true value of sero-diagnosis in dysentery one should note that negative tests are of little value; on the other hand, if agglutination occurs, the possibility of a previous attack of bacillary dysentery or of inoculation against this disease should be duly weighed.*

6. Treatment.

The serum-treatment of bacillary dysentery has received a great impetus. Success would seem to depend to a great extent upon the period of administration and upon the dose. Authorities on this subject have utilized injections of 60-80 cc. or even larger quantities in acute cases. The earlier the injection is made the more gratifying the result; according to KLEIN, the injection of serum after the 7th day of illness has little or no beneficial effect.

The serum generally employed has been a multivalent one, though it has been suggested that it would become more efficacious if it were possible to increase the potency of Shiga antibodies. In cases of great urgency the serum should be given intravenously in doses up to 80 cc.; if given intramuscularly or subcutaneously, larger amounts may be employed. WALLER mentions the injection of 140 cc. of serum subcutaneously in three doses at eight-hourly intervals during the first 24 hours. In cases which do not improve after the first injection a second and similar amount may be given after the lapse of a day or so.

In 56 per cent. of serum-treated cases *serum sickness* develops, and in 12.4 per cent. of these cases it is complicated further by a serum arthritis supervening on the tenth day after injection. The intramuscular route is especially advantageous in that a large amount of serum can be injected so as to excite the minimum amount of pain.

* REFERENCES.

Diagnosis:—General.—SELIGMANN (E.), vol. 8, p. 120; WILLMORE (J. G.) & SHEARMAN (C. H.), vol. 12, p. 311.

Isolation of bacillus from stools.—WHITEHEAD (H.) & KIRKPATRICK (J.), vol. 12, p. 302; MARTIN (C. J.) & WILLIAMS (F. E.), vol. 12, p. 303; MEDICAL RESEARCH COUNCIL (Special Report Series), No. 51; and vol. 16, pp. 475-479; MEDICAL RESEARCH COMMITTEE (Special Report Series), No. 40; vol. 15, pp. 194-198; KLIGLER (I. J.) & OLITSKY (P. K.), vol. 13, p. 231; SCHUERER (J.) & WOLFF (C.), vol. 13, p. 232; LEVINE (M.), vol. 17, p. 24.

Sero-diagnosis.—RITCHIE (T. R.), vol. 8, p. 125; JACOBITZ, vol. 8, p. 448; SCHIEMANN (O.), vol. 9, p. 189; FRASER (H.), vol. 9, p. 191; RAVAUT (P.), vol. 9, p. 429; MARTIN (C. J.), HARTLEY (P.) & WILLIAMS (F. E.), vol. 12, p. 303; FLU (P. C.), vol. 12, p. 304; LOYGUE (G.), BONNET (H.) & PEYRE (E.), vol. 14, p. 108.

Serum-therapy should be combined with the routine use of saline aperients and a carefully regulated diet. Various brands of anti-dysenteric serum have been utilized in different European countries. In British practice the serum produced by the Lister Institute appears to have afforded the best results.

As a means of checking the diarrhoea and at the same time of absorbing the dysentery toxins in the alimentary canal *bolus alba*, or a mixture of animal charcoal and kaolin in equal parts, has come much into vogue, especially in Germany and Austria; this powder should be given suspended in water in doses of three teaspoonfuls every few hours.

German workers have been utilizing the combined vaccine and serum treatment, with inconclusive results. SCHELENZ begins with 0.3 cc. of Boehncke's Dysbacta,* followed by 0.5 cc. on the fourth and fifth days.

The vaccine treatment alone is more applicable to the chronic forms; the vaccine most usually employed consists of *B. Shiga* and *B. Flexner* in equal proportions, sterilized by the addition of 0.4 per cent. carbolic. KAUNTZE in East Africa has injected very considerable doses, commencing with 3,000 million bacteria and repeating every fourth day. More generally much smaller doses are considered advisable. At present it may be stated that the vaccine treatment of chronic bacillary dysentery, whether the vaccines are sensitized or not, has proved to be unsatisfactory.

In intractable cases surgical treatment, either by appendicostomy or right inguinal colotomy, would appear to hold out the best hope of success.†

7. Prophylaxis.

Prophylactic Inoculation.—Excessive reaction produced by injection of killed cultures of dysentery bacilli has militated against their general prophylactic employment. PRATT-JOHNSON and MILNE first endeavoured to overcome this difficulty by sensitizing their emulsions with polyvalent dysentery serum. DEAN and ADAMSON appear to have attempted a similar method by the addition of equal parts of eusol, 1 : 1,000, to an emulsion containing 200 million Shiga bacilli.

In 1917 Graeme GIBSON published a new method of preparation of a vaccine against bacillary dysentery. Dead cultures of the organism are mingled with its homologous antiserum immediately before injection, the resulting suspension being known as a *sero-vaccine*. The addition of the serum minimizes to a great extent the reaction on subcutaneous injection. It was found that if untreated anti-dysenteric serum

* For composition of this substance see under Prophylaxis.

† REFERENCES.

Antiserum treatment.—ROSE (C. W.), vol. 8, p. 452; MEYER (F.), vol. 9, p. 190; FINLAYSON (G. A.), vol. 9, p. 431; WALLER (W. E.), vol. 15, p. 201; KLEIN (B. G.), vol. 15, p. 202.

Bolus alba.—DU MONT, vol. 7, p. 235; IZAR (G.), vol. 9, p. 192.

Vaccine treatment.—MARGOLIS (A.), vol. 11, p. 60; ROSS (P. H.) & KAUNTZE (W. H.), vol. 11, p. 60; BOEHNCKE, vol. 13, p. 237; GROSS, vol. 13, p. 237; SCHITTENHELM, vol. 13, p. 238; SCHELENZ, vol. 13, p. 238; BOEHNCKE & ELKELES, vol. 13, p. 240; RATHERY (F.), RANQUE & RAUX, vol. 14, p. 106; KAUNTZE (W. H.), vol. 17, p. 23.

was utilized, the immunity conferred, as judged by the production of antibodies in the blood, was negligible. Attempts were therefore made to remove the antibacterial portion of the serum whilst leaving the antitoxic portion intact. The vaccine and serum are mixed in the syringe; two doses are given, separated by an interval of seven days, the first dose consisting of 0.25 cc. of vaccine together with the same amount of serum, the second of 0.5 cc. of both vaccine and serum.

The duration of immunity conferred by this method is uncertain and, although a large number of troops were injected during the war, there are no collected figures to show its efficacy or otherwise.

A composite vaccine prepared by BOEHNCKE and known as *Dysbacta* was extolled both as a prophylactic and therapeutic agent in both the German and Austrian armies. In its preparation a 0.5 per cent. carbolized mixture is made, comprising dysentery bacilli in the widest sense (*i.e.*, including both true and so-called pseudo-dysentery strains) together with dysentery toxin and antitoxin (Dys-bac-ta). The prophylactic inoculation consists of three doses of 0.5 cc., 1.0 cc. and 1.5 cc. respectively at five-day intervals; general and local reactions are slight. By the use of this *dysbacta* it is claimed that the spread of dysentery was arrested both amongst the troops and civil population, whilst the production of agglutinins in the blood of those inoculated is considered to prove that immunity has been conferred.

BESREDKA's experiments show that rabbits and mice can be permanently immunized against dysentery organisms by the administration of dysentery vaccines by the *mouth*; he claims that dysentery antibodies are elaborated in the mucosa of the large gut. No record of any trials having been made upon the human subject has yet appeared.

Bacillary Dysentery Carriers.—That individuals infected with the dysentery bacillus alone constitute the reservoir of infection is now generally accepted. It has therefore become necessary to investigate the carrier state. The main types of carrier can be recognized: (a) The *healthy carrier*—one who has never suffered from the disease—is apparently extremely rare (FLETCHER & MACKINNON). (b) The *convalescent carrier* is the main source of danger to the community. In such an individual the condition may be temporary or chronic. Thus the aforementioned observers have recorded that out of a group of 935 dysentery convalescents 6.95 per cent. were carriers of dysentery bacilli, and of these 2.78 per cent. were persistent carriers. The greater proportion, however, are carriers of Flexner-Y bacilli; the true Shiga carriers are in the minority: the latter group, however, are singularly persistent and are generally in a debilitated state of health.

According to PERRY, dysentery bacilli may be excreted continuously over a period of one year; the reviewer has seen one case in which Shiga's bacillus was recovered three years after the initial bacillary dysentery attack.

That the prevention of bacillary dysentery depends largely on measures directed against the housefly has been accepted on all hands. SMITS records the isolation of Shiga's bacillus from flies caught in dysentery barracks. TAYLOR, working under DUDGEON in Salonika, found that the housefly is capable of excreting both Shiga and Flexner organisms for as long as 48 hours. MANSON-BAHR succeeded in isolating Shiga's bacillus in fair numbers from the intestines of "wild flies"

in Palestine; the insects were trapped in the open desert far from human habitation. He is of the opinion that under natural conditions the housefly is capable of harbouring in its intestinal tract dysentery bacilli for some considerable period.*

The continuation (Amoebic Dysentery) will appear in the next number.

* REFERENCES.

Preventive inoculation.—PRATT-JOHNSON (J.) & MILNE (A. J.), vol. 7, p. 219; DEAN (H. R.) & ADAMSON (R. S.), vol. 8, p. 124; SEIFFERT (G.) & NIEDIECK (O.), vol. 8, p. 130; LOEWY (O.), vol. 8, p. 453; GIBSON (H. G.), vol. 11, p. 59; BOEHNCKE, vol. 12, p. 20; OLITSKY (P. K.), vol. 12, p. 308; BISCHOFF (H.), vol. 14, p. 112; BESREDKA (A.), vol. 13, p. 242; vol. 17, p. 25.

Carriers of *B. dysenteriae*.—VERZÁR (F.) & WESZECZKY (O.), vol. 8, p. 121; FLETCHER (W.), vol. 12, p. 18; MEDICAL RESEARCH COMMITTEE [FLETCHER (W.) & MACKINNON (D. L.)] (Special Report Series), vol. 14, p. 330; PERRY (H. M. J.), Private communication, and in BYAM & ARCHIBALD'S "Practice of Medicine in the Tropics."

Carriage of *B. dysenteriae* by flies.—SMITS (J.), vol. 6, p. 475; DUDGEON (L. S.), vol. 15, p. 194; MANSON-BAHR (P.), vol. 16, p. 10.

KALA AZAR.

NICOLLE (Charles). **Chronique du Kala-Azar en Tunisie.**—*Arch. Instituts Pasteur de l'Afrique du Nord*. 1921. Mar. Vol. 1. No. 1. pp. 33-39.

This paper contains a summary of the observations on kala azar in Tunis since the discovery of the first case there by CATHOIRE in 1906. Spleen puncture has been performed in 172 cases which showed symptoms like those of kala azar, but leishmania were discovered in only 59. Of these, 46 were either Italian or directly connected with Italians. This is explained by the fact that persons of this nationality live in closer association with dogs than the French, Maltese or other inhabitants. It also serves to prove that the disease was introduced by Italians.

Children under five months' old have not been found infected. Most cases occur between the ages of one and three years, while the disease is rare in those above this age. The oldest child with kala azar was nine years of age.

The distribution of the disease in Tunisia is shown by the following records of cases for these districts: Tunis, 42; Bizerte, 8; Béja, 2; Kef, 5.

Kala azar in dogs, a disease which is considered to be identical with that of children, is more commonly met with.

Some interesting figures are given with regard to the culture of leishmania and allied flagellates on NNN medium. Three strains of leishmania from cases of kala azar have been maintained for 291, 241 and 59 subcultures. The first strain was isolated over ten years before the date of writing. Two strains from dogs have passed through 241 and 230 subcultures. Similarly, three strains of the parasite of oriental sore have been kept for 280, 28 and 26 subcultures. Three strains of the leptomonas cultivated from the blood of geckos have reached their 84th subculture and two others the 30th, while the trypanosome of the toad has been maintained for 89 subcultures.

The cases of anaemia with enlarged spleen in children, in which leishmania cannot be demonstrated, appear to be due to a distinct disease. It is most commonly seen amongst the Jews. The many investigations conducted with a view to discovering the etiology of this disease have yielded only negative results.

C. M. Wenyon.

KLIPPEL & MONIER-VINARD. **Un cas de kala-azar d'origine marocaine.**

—*Bull. et Mém. Soc. Méd. Hôpit. de Paris*. 1921. 3rd Series. Vol. 45. July 14. No. 24. pp. 1037-1038.

Kala azar in human beings has not hitherto been described from Morocco, and the authors record the first case from this locality in a young girl.

C. M. W.

GATT (T. E. H.). **A Case of Splenic Anaemia in a Child due to *Leishmania infantum*.**—*Jl. Roy. Army Med. Corps*. 1921. Aug. Vol. 37. No. 2. pp. 142-143.

A record of a fatal case of kala azar in a child of three years of age. The disease was contracted in Malta, where the child was born.

C. M. W.

CARNOT (P.) & LIBERT (E.). **Un cas de kala-azar, d'origine macédonienne, survenu chez un adulte et observé à Paris.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1921. July 14. 3rd Series. Vol. 45. No. 24. pp. 1039-1046. With 1 chart in text.

The authors describe in detail the history of a man who contracted kala azar during the war in Macedonia. The nature of his illness was not suspected till two and a half years had elapsed. Puncture of the spleen revealed the characteristic parasites. The patient died in spite of injections of tartar emetic, to which, however, he reacted very badly on account of his much reduced condition.

C. M. W.

MAZZONI (L.). **Ricerche ematologiche in bambini leishmaniotici dopo l'iniezione di adrenalina.**—*Pediatria.* 1921. Apr. 15. Vol. 29. No. 8. pp. 347-359.

With a view to facilitating the diagnosis of infantile kala azar by blood examination, the author investigated the effect of adrenalin administration on the presence of leishmania in the peripheral circulation. In all, twenty-six cases were studied and the following conclusions were arrived at:—

1. In blood taken half an hour after an injection of adrenalin the parasites are present in greater numbers than they were before. The increase, however, is hardly sufficient to justify this procedure as a means of diagnosis.

2. The injection is followed by a leucocytosis, which in some rare cases results in the number of cells being doubled.

3. The leucocytosis is only transitory, for it has disappeared in an hour, and is followed by a leucopenia.

C. M. W.

BRAHMACHARI (U. N.). **The Treatment of Kala-Azar with some New Antimonial Preparations.**—*Jl. Trop. Med. & Hyg.* 1921. Aug. 15. Vol. 24. No. 16. pp. 213-215.

Attention is drawn to a number of new antimonyl compounds, some of which the author has tried in the treatment of kala azar.

Urea-antimonyl tartrate was used intravenously in four cases. The dose given was 2-6 cc. of a 2 per cent. solution. The duration of the observation is given for only one of the four cases. It extended over four months. Fever had ceased to occur, the blood picture showed improvement, while the spleen was much reduced in size. In three of the cases it is stated that *L. donovani* disappeared from the spleen. No information is given about the disappearance of parasites in the fourth case.

It is concluded that the action of urea-antimonyl tartrate is not superior to that of sodium or potassium antimonyl tartrate, though the vomiting, cough and rise of temperature associated with the use of the latter drugs appear to be absent. The compound was used intramuscularly in two cases. The dose was 1-2 gr. daily in one case and $\frac{1}{2}$ -1 gr. in the second. In the first case no parasites could be found in the spleen after 20 injections, and in the second case after 16 injections. The general improvement was similar to that occurring in the cases treated intravenously. In both cases the local reactions were less severe than after intramuscular use of potassium antimonyl tartrate.

Ammonium antimonyl tartrate has been used intramuscularly in one case. The dose employed was 1-2 cc. of a 2 per cent. solution. Fever ceased after three injections, but it is too early to report on the final result. The salt is much less irritating than ammonium potassium antimonyl tartrate.

Three other compounds have been prepared: (1) Phenyl-stibinic acid and its sodium and ammonium salts; (2) P-amino-phenyl-stibinic acid and its sodium salt; (3) Acetyl-amino-phenyl-stibinic acid and its sodium salt.

The salts of phenyl-stibinic acid are too irritating to be used therapeutically. "Stibenyl," which is allied to No. 3, has been used in two cases of kala azar—in one intramuscularly and in the other intravenously. Intravenously the dose varied from 0.1-0.8 gm., and the same dose was given intramuscularly. In the latter case there was much local irritation, and in both eruptions appeared on the body. In the case treated intravenously parasites disappeared from the spleen.

P-amino-phenyl-stibinate of sodium, for which the name "Stibamine" is proposed, has been used intramuscularly in one case in doses up to 0.3 gm.

Attention is drawn to the increase in the leucocyte-count following the intravenous injection of narcotine, an increase which does not seem to be merely a temporary phenomenon. A compound of narcotine and antimony tartrate has been prepared.

In summing up the results of his observations, the author states that, as the best antimonial preparation for the treatment of kala azar has yet to be discovered, one must not rest contented with the use of tartar emetic or antimonyl sodium tartrate.

C. M. W.

- i. MANSON-BAHR (Philip). ii. ALLEN & HANBURY, LTD. **Intravenous Injection of Stibenyl in Kala-Azar.** [Correspondence].—*Lancet*. 1921. May 7 & 21. p. 991; p. 1102.

i. In this letter Manson-Bahr points out that he has been informed that in India severe and alarming symptoms have followed the use of organic antimony compounds in the treatment of kala azar, though he himself had remarkably good results in one case. In a more recent case of his the administration of 0.4 gm. produced vomiting and diarrhoea. He still believes that the acetyl-*p*-amino-phenyl salt of antimony holds out better prospects for the treatment of kala azar than the potassium or sodium tartrates, and he would advocate a further trial, commencing with smaller doses of 0.05 and 0.1 gm.

ii. Messrs. Allen & Hanburys, from whom the preparation referred to above came, write to state that before issue it is tested by the Medical Research Council and that the drug issued by them conforms with the standard of the Medical Research Council.

C. M. W.

- THOMSON (J. Gordon) & SINTON (J. A.). ***Leishmania donovani*, in Cultures, recovered from Spleen during Life and from the Bone Marrow of the Cadaver.**—*Proc. Roy. Soc. Med.* (Sect. of Trop. Diseases & Parasit.). 1921. June. Vol. 14. No. 8. pp. 21-23.

The note under review draws attention to the fact that leishmania may remain alive in the organs some time after death. From the bone marrow successful cultures of *Leishmania donovani* were obtained

at the autopsy of a case of kala azar fourteen hours after death. The patient had been treated with tartar emetic, so it is evident the drug had failed to kill the parasites. Cultures of *L. tropica* were also obtained from a case of oriental sore which was undergoing tartar emetic treatment. [KNOWLES has shown in India that cultures of *L. donovani* can be obtained from the spleens of cases of kala azar which ultimately recover, even after they have received 174 cgm. of the drug, this *Bulletin*, Vol. 17, p. 353.]

C. M. W.

BACQUÉ (B.) **À propos d'un cas de bouton d'Orient observé dans le pays des dunes (Oued Souf, Sahara Constantinois).**—*Arch. Instituts Pasteur de l'Afrique du Nord*. 1921. Mar. Vol. 1. No. 1. pp. 82-84. With 1 fig.

The author records a case of oriental sore which was apparently contracted at the oasis of Souf, which is separated from all other habitable districts by a barrier of sand 100 kilometres in breadth. LEGRAIN (1896) considered that the disease did not occur in such localities, but the observations made on the case here mentioned and the fact that the characteristic scars occur on the faces of the Souf inhabitants lead the author to the conclusion that LEGRAIN's statement is not correct. At Souf flies are abundant all the year round; mosquitoes occur in winter and spring, but in small numbers. They disappear entirely in summer. Phlebotomus, however, is prevalent. The author expresses no opinion as to which of these is responsible for the carriage of oriental sore.

C. M. W.

RAVAUT (Paul). **Deux cas de Leishmaniose cutanée contractée en Espagne et en France. Premier cas de contagion en France.**—*Ann. de Dermat. et de Syph.* 1921. 6 Sér. Vol. 2. No. 1. pp. 29-37. With 2 figs.*

This paper gives further details of the two cases of oriental sore previously reported by the author from Spain and France (see this *Bulletin*, Vol. 16, p. 457).

C. M. W.

RISIQUE CEBRIAN (R.) & VARGAS PESADO (A. Martinez). **[Un cas de leishmaniose tropicale à Barcelone.]**—*Estudios Médicos de Murcia*. 1920. June. Analysé dans *Gac. Méd. Catalana*. 1920. July 15. Vol. 57. No. 1033. p. 7. [Summarized in *Bull. Office Internat. d'Hyg. Publique*. 1921. June. Vol. 13. No. 6. pp. 637-638.]

This note records a case of oriental sore at Barcelona. A dog was inoculated (method not stated) and an autopsy was performed 45 days later. *Leishmania* was demonstrated in the spleen.

C. M. W.

DUCKWORTH (G. F.). **Oriental Sore.** [Practical Notes.]—*Practitioner*. 1921. May. Vol. 106. No. 5. (No. 635.) p. 377.

The note describes a treatment which the writer found very efficacious in Mesopotamia. After removal of the scab from the

sore a piece of lint the exact size of the ulcer is soaked in a solution of urotropine (one drachm to the ounce of distilled water) and then applied as a dressing. The application is made twice daily and is continued until healing has taken place.

C. M. W.

SINTON (J. A.). **Notes on Oriental Sore in Russian Turkestan and the Results of Treatment with Injections of Tartar Emetic Solution.**—*Ann. Trop. Med. & Parasit.* 1921. July 16. Vol. 15. No. 2. pp. 107–112.

The paper describes six cases of oriental sore which were successfully treated with intravenous injections of tartar emetic (2 per cent. in normal saline solution). All the six cases recovered in 8 to 21 days after the commencement of the treatment. The total amount of the drug, given in two to four injections, varied from 10 to 28 cgm. The disease in Turkestan seemed to respond more readily to tartar emetic than that of Mesopotamia.

C. M. W.

TRESTON (M. L.). **Some Notes on Oriental Sores.**—*Lancet.* 1921. Aug. 6. p. 270.

As a result of experience gained in Mesopotamia the writer advocates the following lines of treatment for oriental sore :—(a) For sores in the early stages, X-ray applications and crystals of potassium permanganate ; (b) for fairly advanced sores, crystals of potassium permanganate and intravenous tartar emetic ; (c) for sores in the advanced stages, thorough scraping under chloroform and application of ol. ricini dressings ; (d) for sores on the face, other than those in a very early stage, intravenous tartar emetic.

C. M. W.

i. McDONAGH (J. E. R.). **Some Remarks on the Development of the Leishman-Donovan Bodies.**—*Proc. Roy. Soc. Med.* (Sect. of Dermat.). 1921. Apr. Vol. 14. No. 6. pp. 55–58. With 1 fig. (Discussion. p. 59.) Also: *Brit. Jl. Dermat. & Syph.* 1921. May. Vol. 33. No. 5. (No. 391.) pp. 182–188. With 4 figs.

The subject matter of these papers is that of an earlier one by the same author, which was noted in this *Bulletin*, Vol. 17, p. 360. The present communications are accompanied by illustrations, which only confirm the comments made in the previous review.

C. M. W.

- i. PATRICK (Adam). **A Case of Multiple Oriental Sores (Leishmaniasis) Treated by Intravenous Injections of Antimony.**—*Trans. Roy. Med.-Chirurg. Soc. Glasgow.* 1921. Vol. 14. p. 96.
- ii. GASTOU & PONTOIZEAU. **Deux cas de Leishmanioses (Bouton de Biskra).**—*Bull. Soc. française de Dermat. et de Syph.* 1921. No. 1. pp. 19–21.
- iii. LOMBARDO (C.). **Di un caso di bottone di oriente osservato in Sardegna.**—*Giorn. Italiano d. Malat. Ven. e d. Pelle.* 1921. Vol. 62. (56th Year.) No. 1. pp. 5–14. With 1 plate.
- iv. SPENCER (Robert D.). **A Case of Oriental Sore (of Italian origin) encountered in the United States.**—*Jl. Amer. Med. Assoc.* 1921. May 28. Vol. 76. No. 22. pp. 1494–1495. With 3 text figs.

These papers describe typical cases of oriental sore.

C. M. W.

RELAPSING FEVER.

CRAGG (F. W.). **A Note on Relapsing Fever in India, with Special Reference to its Seasonal Prevalence.**—*Indian Jl. Med. Res.* (Special Indian Science Congress Number, 1920.) pp. 22–28.

The object of this communication is to draw attention to the seasonal incidence of relapsing fever as it occurs in the United Provinces. The disease is widespread in India and, as is the case in most countries, it is usually a winter disease and is carried by lice, which attain their maximum development at this season. In the United Provinces, however, relapsing fever occurs in the hottest time of the year—in March, April, and May. The total number of cases in these outbreaks is not large and might be accounted for by the importation of lice on the bodies of recruits, who harbour these creatures in small numbers during the summer months. The author, however, is not entirely satisfied with this explanation and points out that BROWN, who investigated similar outbreaks, thought that possibly a pentatomid bug, *Bragada picta*, might be the vector. As several distinct clinical types of relapsing fever have been described in India, it is possible that this summer variety differs from the classical winter form in being conveyed by some agent other than the louse, in spite of the fact that the causative organism cannot be differentiated.

C. M. Wenyon.

SINTON (J. A.). **Relapsing Fever at Meshed, North-East Persia.**—*Indian Med. Gaz.* 1921. July. Vol. 56. No. 7. pp. 241–250. With 11 charts in text.

In view of the fact that a form of relapsing fever supposed to be conveyed by ticks has been described by HAROLD and WRIGHT from certain parts of Persia, the writer wishes to draw attention to an outbreak which he observed at Meshed in the Khorasan Province. The paper is mostly confirmatory of an earlier one by FRY [see this *Bulletin*, Vol. 16, p. 167]. In the outbreak now recorded the writer concludes that lice were the agents of transmission and states that ticks could not be found.

C. M. W.

- i. KENNEDY (J. C.). **Some Observations on the Pathology of Relapsing Fever.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1921. Feb. 18. Vol. 14. No. 6. pp. 99–104. With 1 fig. in text. (Discussion. pp. 104–107.)
- ii. ——. **Parasites (? Developmental Stages of *Spirochaeta recurrentis*) in the Liver of a Fatal Case of Mesopotamia Relapsing Fever.** [Correspondence.]—*Jl. Roy. Army Med. Corps.* 1921. Sept. Vol. 37. No. 3. p. 238. With 2 text-figs.
- iii. WILLCOX (W. H.). **The Pathology of Relapsing Fever.** [Correspondence.]—*Lancet.* 1921. Mar. 26. p. 666.

i. The paper read before the Royal Society of Tropical Medicine and Hygiene gives a further account of the histological changes noted by the author in the liver of a case of relapsing fever. A previous paper on the same subject was reviewed in this *Bulletin*, Vol. 17, pp. 375–6.

ii. In his letter to the editor the author points out that he now believes that the bodies described are probably not of protozoal nature. They seem to be phases in the degeneration of polynuclear leucocytes, which takes place in such a way as to cause each lobe of the nucleus to be reduced to a perfectly clear area, at the centre of which is a substance which takes the stain.

iii. In the *Lancet* report of the discussion of KENNEDY's paper at the Royal Society of Tropical Medicine and Hygiene, Willcox's statement that in Mesopotamia the mortality-rate of relapsing fever amongst Arabs was 1 per cent., while it was 8 per cent. amongst the Indians, was misquoted, the figures being reversed. This error Willcox here corrects.

C. M. W.

- i. CAWADIAS (Alex.). **Le syndrome hémorragique de la fièvre récurrente.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1921. July 21. No. 25. pp. 1105-1107.
- ii. ——. **Le syndrome méningo-encéphalique au cours de la fièvre récurrente.**—*Ibid.* pp. 1107-1110.

These papers draw attention to two syndromes which occur in cases of relapsing fever.

i: In one there is a tendency to haemorrhage. Its commonest manifestation is an epistaxis, which is usually an indication of a heavy infection. It may occur at the commencement of the illness or at a later stage, but is characterized by its violence, the patient being literally bathed in blood. It is difficult to arrest, persists for a long time, and may reduce the patient to a condition of semi-syncope. Epistaxis occurred in 60 per cent. of the cases observed. On two occasions the haemorrhagic syndrome revealed itself in the form of haematuria. In both these cases spirochaetes were discovered in the blood.

ii. The second syndrome is described as being of the meningo-encephalitic type. In a mild degree it shows itself in the severe headache and backache which is a recognized feature of the disease. The patients are in a condition of profound prostration. The eyeball becomes very sensitive to pressure, while the tendon reflexes are exaggerated. In about 3 per cent. of cases, however, the condition is so marked that a mistaken diagnosis is easily made. The condition commences as just described, but the symptoms soon assume the characters of those of cerebro-spinal meningitis with marked opisthotonos and definite Kernig's sign. The patient ceases to notice his surroundings and does not react even to violent stimulations. Sometimes there is a mild form of delirium. Lumbar puncture shows a slightly increased tension. Microscopic examination of the fluid shows a few red cells and lymphocytes, but, in spite of very careful search, no spirochaetes.

C. M. W

- NITZESCU (J. J.). **Le liquide céphalorachidien dans la fièvre récurrente.**
—*C. R. Soc. Biol.* 1921. May 28. Vol. 84. No. 19. pp. 1037-1038.

During an epidemic of relapsing fever numerous microscopic examinations of the cerebro-spinal fluid were made. In no case were

spirochaetes demonstrated, in spite of the fact that in four patients the symptoms were of such a nature that they were sent to hospital as cases of cerebro-spinal fever. As a further test of the presence of spirochaetes the cerebro-spinal fluid from eight cases was injected subcutaneously into healthy subjects. Of these, five became infected, a result which confirmed the original statement of COMBIESCU that spirochaetes were present in the fluid. They evidently occur only in small numbers and do not produce any change in the cellular constituents.

C. M. W.

SACEGHEM (René). **Le pétrole dans le traitement de la fièvre récurrente et de la trypanosomiase.**—*C. R. Soc. Biol.* 1921. June 4. Vol. 85. No. 20. pp. 11-12.

The object of the note is to draw attention to a treatment of relapsing fever which is used in Ruanda in Central Africa. A large spoonful of petroleum is taken each morning and evening for four days. The author states, without giving any details of what he means, that the cures are numerous amongst the natives.

C. M. W.

DELANOË (P.). **De la spirochétose des Gallinacés dans le Cercle des Doukkala.**—*Bull. Soc. Path. Exot.* 1921. June 8. Vol. 14. No. 6. pp. 316-320.

A record of the occurrence of spirochaetosis of fowls in Morocco. As elsewhere, the agent of transmission is *Argas persicus*.

C. M. W.

i. ROBERT (Léopold). **Sur onze cas de bronchite sanglante (maladie de Castellani) à association fuso-spirillaire de Vincent.**—*C.R. Soc. Biol.* 1921. July 2. Vol. 85. No. 24. pp. 230-232.

ii. —. **Sur le rôle de l'association à fuso-spirochètes de Vincent dans l'étiologie de la bronchite sanglante de Castellani.**—*Ibid.* July 9. No. 25. pp. 285-286.

In eleven cases of spirochaetal bronchitis the writer has noted the presence of fusiform bacilli as well as spirochaetes. He insists on the necessity of making repeated examinations for tubercle bacilli, even in those cases in which the fusiform bacilli and spirochaetes are plentiful, as the two conditions may be associated. He believes, with some justification, that the fusiform bacilli and spirochaetes are identical with those associated with Vincent's angina, and concludes that *Spirochaeta bronchialis* of Castellani and Fantham is the same organism as *Spirochaeta vincenti* of Blanchard, from which they cannot be distinguished.

C. M. W.

BLOEDORN (W. A.) & HOUGHTON (J. E.). **Bronchial Spirochaetosis.**—*Jl. Amer. Med. Assoc.* 1921. June 4. Vol. 76. No. 23. pp. 1559-1563. With 4 charts in text.

This paper draws attention to the existence of bronchial spirochaetosis in the United States, a disease which is probably more widespread than is generally recognized. As has been so frequently noted, the resemblance to pulmonary tuberculosis is emphasized.

A routine examination for spirochaetes of all sputa is advocated, and their presence should be regarded as significant, unless proved otherwise. The disease is capable of transmission to uninfected persons, though the degree of contagiousness is not great. An individual harbouring the spirochaetes may present little or no evidence of the disease, so that it appears that there exist carriers of *Spirochaeta bronchialis*. The disease as a rule responds readily to treatment and of the arsenical preparations, arsphenamine or neo-arsphenamine is very efficacious. [As it is admitted that carriers exist it is difficult to understand the remark "their presence should be regarded as significant, unless proved otherwise." Presumably the cases in which the spirochaetes are of no significance are the carrier cases, which should be of great significance from the point of view of spread of the disease. The evidence seems to be accumulating that the spirochaetes in the sputum are really oral spirochaetes, which have found a suitable medium in the bronchi, and the paper by ROBERT reviewed in this number bears this out, as also one by MÜHLENS (this *Bulletin*, Vol. 16, p. 462), who states that spirochaetal bronchitis as a distinct disease does not exist.]

C. M. W.

KORTHOFF (G.). **Spirochaetosis bronchialis**.—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1921. Vol. 61. No. 1. pp. 71-78. With 1 plate.

The author draws attention to the frequency of spirochaetal bronchitis in the Dutch East Indies. After reviewing the history of our knowledge of the disease since the first case was recorded by CASTELLANI in 1906, he quotes six cases, one of which showed the clinical symptoms described by CASTELLANI. One case was complicated by tuberculosis, while the others were of a mild nature. For staining the spirochaetes the author advocates the method of BECKER [this *Bulletin*, Vol. 16, pp. 188-189]:—

1. Fix the smear during one minute in formaline 10 per cent., acetic acid 5 per cent.
2. Heat the slip while covered with 10 per cent. tannine solution.
3. Stain with carbolfuchsin.

The spirochaete will then show a brilliant red colour.

W. J. Bais.

LEVADITI (C.), MARIE (A.) & ISAÏCU. **Recherches sur la spirochétose spontanée du lapin**.—*C.R. Soc. Biol.* 1921. June 11. Vol. 85. No. 21. pp. 51-54.

The paper gives a description of *Spirochaeta cuniculi* (Jakobsthal), an organism which closely resembles *Treponema pallidum* and which produces genital and nasal lesions in the rabbit. Three rabbits with a natural infection were studied.

C. M. W.

PRINGAULT (E.). **Présence de spirochètes chez *Phlebotomus perniciosus*, Newstead**.—*C.R. Soc. Biol.* 1921. Jan. 29. Vol. 84. No. 4. pp. 209-210.

The author in the course of an unsuccessful search in the *Phlebotomus* of Marseilles for the *Herpetomonas phlebotomi*, found by WENYON in Aleppo and by MACKIE in Madras, discovered numerous Spirilla in

the gut of a specimen of *Phlebotomus perniciosus*. The forms seen are described and are provisionally named *Spirochaeta phlebotomi*. They measured on an average 10–14 μ in length by 0.2–0.25 μ in thickness.

A. Alcock.

HOFFMANN (Erich). **Die Bedeutung des Dunkelfelds für die Untersuchung der Gelbfieber-, Syphilis- und anderer Spirochäten sowie sonstiger Mikroorganismen und kleinster Gebilde in gefärbten Ausstrichen und Schnitten [Leuchtbildmethode].—***Berlin Klin. Woch.* 1921. Jan. 24. Vol. 58. No. 4. pp. 73–75. With 2 figs.

The paper draws attention to the value of the dark field in the study of spirochaetes and other organisms in stained films and sections. It was demonstrated that spirochaetes and the more difficult leptospira are readily seen in smears stained by silver nitrate, Giemsa or carbol fuchsin, and that all the finer details of structure can be detected. The reviewer is under the impression that some years ago LEISHMAN drew attention to the fact that spirochaetes could be studied by the dark field method in stained films.

C. M. W.

LAVERAN (A.) & FRANCHINI (G.). **Spirochétose de punaises des euphorbes et du latex.**—*Bull. Soc. Path. Exot.* 1921. Apr. 13. Vol. 14. No. 4. pp. 205–207. With 2 text figs.

The authors have noted the presence of spirochaetes in the latex of euphorbia, which, under certain conditions, is known to harbour a flagellate of the leptomonas type. The latter has been found to be carried from plant to plant by Lygeid bugs. Both in the latex of the plants and in the intestine of the bugs spirochaetes have been discovered and the writers are of opinion that in addition to the flagellate condition one must admit a spirochaetosis of the euphorbias which is carried by the same bugs.

C. M. W.

YELLOW FEVER.

- i. GUITERAS (Juan). [In Spanish and English.] **Expedicion al Africa y estudios de fiebre amarilla. Conferencia pronunciada en la Academia de ciencias de la Habana el 14 de Febrero de 1921.**—Observations on Yellow Fever, in a Recent Visit to Africa. Lecture delivered before the Academy of Medicine of Havana on February 14, 1921.—Reprinted from *Sanidad y Beneficencia*. 1921. Jan. Feb. Mar. Vol. 25. Nos. 1, 2 and 3. pp. 21–43.
- ii. ——. **Expedicion al Africa y estudios de fiebre amarilla.**—*Rev. Med. y Cirug. Habana*. 1921. Mar. 10. Vol. 26. No. 5. [Summarized in *Bull. Inst. Pasteur*. 1921. June 15. Vol. 19. No. 11. p. 401.]

These papers give an account of the work of the Commission which was to have investigated yellow fever under the direction of the late Surgeon-General GORGAS, who was prevented from undertaking the work on account of the fatal illness to which he succumbed in London on his way out to West Africa.

The writer, under whom the Commission proceeded to West Africa, could discover no cases of yellow fever and the Commission were struck by the absence of the extreme heat and numerous mosquitoes which characterize yellow fever localities in South America. It appeared that yellow fever had a very precarious footing in West Africa and it was possible that it had already disappeared. The last epidemic occurred in 1910–12.

The writer expresses his views on the organism which NOGUCHI has isolated from cases of yellow fever and which he supposes to be the causative agent of the disease. For the following reasons Guiteras doubts if there is any etiological connection between NOGUCHI's *Leptospira icteroides* and yellow fever:—

1. If animals were as susceptible to yellow fever as they are to the leptospira, then the disease would occur as an epizootic amongst animals during yellow fever outbreaks.
2. If animals were susceptible one would not be able to eradicate the disease as easily as it is now possible to do it.
3. NOGUCHI has only been successful in cultivating the organism from a small percentage of the cases of yellow fever from which attempts were made.
4. He has obtained cultures from the blood after the third day of the disease, by which time, as shown by the American Commission, the blood is no longer infective to man.
5. NOGUCHI's organism is with difficulty transmitted to animals by Stegomyia.
6. The lesions produced by the injection of the organism differ from those of yellow fever.
7. Dr. LEBREDO was unable to transmit the virus to guinea-pigs from 25 cases of yellow fever in Yucatan and five cases in Havana.

C. M. Wenyon.

COHN (Alfred E.) & NOGUCHI (Hideyo). **Etiology of Yellow Fever. XIII. Behaviour of the Heart in the Experimental Infection of Guinea Pigs and Monkeys with *Leptospira icteroides* and *Leptospira ictero-haemorrhagiae*.**—*Jl. Experim. Med.* 1921. June 1. Vol. 33. No. 6. pp. 683–692. With 4 charts in text and 2 plates.

The authors begin their paper by pointing out that a slowing of the heart beat is regarded as a pathognomonic sign in the early stages of yellow fever (Faget's sign). With a view to obtaining an explanation of this phenomenon, the changes produced in the heart rhythm of animals inoculated with *Leptospira icteroides* were investigated.

The following conclusions were reached :—

1. Slowing of the heart occurred in monkeys and guinea-pigs during the febrile period of the experimental infection due to *Leptospira icteroides*. A similar reaction took place in animals inoculated with *Leptospira ictero-haemorrhagiae*.

2. The mechanism of slowing was usually due to slowing of the whole heart

3. Once, incomplete heart block was seen. Changes in the ventricular complex occurred four times.

C. M. W.

NOGUCHI (Hideyo). **Prophylaxis and Serum Therapy of Yellow Fever.**—*Jl. Amer. Med. Assoc.* 1921. July 16. Vol. 77. No. 3. pp. 181–185. With 5 charts in text.

After a brief résumé of his investigations into the etiology of yellow fever, the writer gives an account of the action of the immune serum of horses in cases of yellow fever in man. At the time of writing he had records of 170 cases of the disease which had been treated by various medical men by the serum method. Of cases treated before the third day of the disease there were 95, of which 82 recovered, while of those treated after the third day there were 75, of which 36 recovered. This gives a mortality of 13·6 per cent. in the first group and 52 per cent. in the second. The normal mortality-rate for yellow fever in the various localities in which the serum treatment has been adopted varied from 51 to 100 per cent.

Vaccination by injection of killed cultures was tried on a large scale in various endemic centres. An analysis of the results is shown in a series of tables. In Guayaquil it was estimated that in a total population of 80,000 there were 4,000 non-immunes. Of these, 427 were vaccinated in 1918 and 1919. The incidence of yellow fever amongst the vaccinated was 11 per 1,000, and amongst the unvaccinated 110 per 1,000. In Salvador in ten infected localities there were 113,000 inhabitants. Of these, 3,607 were vaccinated. The incidence of undoubted yellow fever amongst them from May to December, 1920, was nil, whilst the unvaccinated supplied 181 cases. Similar results were obtained in Guatemala and Tuxpan in Mexico.

The writer concludes that anti-icteroides serum reduces the mortality from yellow fever when used on or before the third day, but has little effect when given after the third day. Prophylactic vaccination with 2 cc. of killed cultures containing at least 2,000,000,000 organisms per

cubic centimetre is of definite protective value. Amongst 3,230 persons who received two doses of vaccine no cases of yellow fever occurred, while 278 cases occurred amongst the unvaccinated. Amongst 4,307 persons receiving a single dose there were only five suspicious cases. The protection does not become evident till ten days after the injections.

C. M. W.

MALAGUETA (I.). **Contribuição ao estudo da epidemiologia de Pernambuco.**—*Arch. Brasileiros de Med.* 1920. Mar. Vol. 10. No. 3. pp. 141–157.

An account of an epidemic of yellow fever at Caruaru in Pernambuco during February and March, 1918.

C. M. W.

YAWS.

VAN NITSEN (R.). **Les manifestations tertiaires du Pian dans la région du Tanganika-Moëro.**—*Ann. Soc. Belge de Med. Trop.* Brussels. 1920. Nov. Vol 1. No. 1. pp. 39–54. With 1 folding plate containing 8 illustrations and 1 map.

Of 699 yaws patients seen by the author in the region west of Lake Tanganyika, he found tertiary lesions in the majority; 459 were closely studied, and the table sums up the findings. The various manifestations are described. The tertiary period thus takes chiefly the form of ulceration, by preference on the trunk and limbs, where the course is serpiginous. When the nose, fingers, toes, penis, lips and soft palate are attacked the mutilation may be serious, and in the extreme cases the condition is that of gangosa. Articular and bone lesions are often present as well. The tertiary period begins either towards the end of the secondary, or 10, 15, or 25 years later. It is met with at any age, in one instance at a year and a half. At one place 22 per cent. of 700 patients presented tertiary lesions. The author gives several reasons for attributing these lesions to yaws, and states that the natives distinguish them from syphilis, which is rare.

A number of cases are given in some detail:—

TERTIARY LESIONS IN 459 YAWS PATIENTS.

1. Skin Lesions . . .	{	1. Purulent Ulcers . . .	279	{	Developing super- ficially on the trunk and limbs	{	Nose . . .	29
		2. Crusted Ulcers . . .	124					
		3. Fissures . . .	13						Going deep . . .
2. Lesions of the Mucosa . . .	{	1. Pains . . .	178	{	With effusion . . .		5	
								2. Arthritis . . .		..	Dry, causing deformity	69
3. Joint Lesions . . .	{	1. Severe pains . . .	72	{	Hypertrophy . . .	42		
							4. Bone Lesions . . .	{	2. Osteitis and Periostitis . . .	..	Exostoses . . .	12
3. Necrosis . . .	27	Dactylitis . . .	23					
				4. Rarefaction and Resorption of Bone . . .	3			

A. G. B.

NOEL (P.). **Pian des muqueuses.**—*Ann. de Dermat. et de Syph.* 1921. 6 Ser. Vol. 2. No. 2. pp. 72–81.

The author, an army surgeon in the Cameroons, finds that the lesions of the mucosa in yaws are neglected in the literature when their existence is not explicitly denied. Almost alone CASTELLANI has given some description of them. Noel has studied 100 cases in the Cameroons. Seven of the patients were under one year, 39 between one and 15, 51 between 16 and 30. Apart from the genital and anal regions, the secondary lesions of yaws were found on the mucosa of the mouth (22), nose (19) and conjunctiva (4). They usually date from the first three months. The lesions are carefully described. The diagnosis is based on their aspect, colour, papillomatous appearance, the softness of the base, the benignity, and the ready and complete cure, and is always facilitated by the coexistence of skin lesions.

A. G. B.

KURITA (T.). **Ueber einen Fall von Framboesia tropica, combinirt mit Lichen pilaris aehnlichem Ausschlage.**—*Japan. Ztschr. f. Dermat. u. Urol.* 1920. Oct. Vol. 20. No. 10. pp. 884-886. [In Japanese. German Autoreferat, p. 77.]

According to the German "Autoreferat," the author, during a stay on Truck Island in the East Caroline Archipelago, saw many cases of yaws. The case here described was one in which a hyperkeratosis resembling Lichen pilaris and affecting the whole body appeared on faintly leucodermic spots.

A. G. B.

SCHAMBERG (Jay Frank) & KLAUDER (Joseph Victor). **A Study of a Case of Yaws (Framboesia tropica) contracted by an American Soldier in France.**—*Arch. Dermat. & Syph.* 1921. Jan. Vol. 3. No. 1. pp. 49-75. With 13 text-figs. Also shorter note in *Amer. J. Trop. Med.* 1921. Jan. Vol. 1. No. 1. pp. 49-51.

This study by two American professors of dermatology and syphilology is well illustrated and is fairly exhaustive. The patient joined the Royal Canadian Army as a cavalryman in 1917, and reached France in July, where he remained till August, 1919. Most of this time was spent at Etappes [? Étapes]. He did not meet dark-skinned soldiers except in the streets or in saloons and Y.M.C.A. huts, and never slept in the same barracks. Arrived in England from France he went into hospital at Aldershot with rheumatoid pains in the knees and shoulders, at times sufficiently severe to incapacitate him. He had fever, 104-105° F., for 3-4 days. He was in hospital one month and had no skin manifestation. He left hospital in September and landed at Halifax in October. About a week after his return to Philadelphia he noticed "pimples" on his palms and a week later lesions on the scalp and soles.

On admission to hospital, December 30, 1919, there was a generalized adenopathy and a crusted eruption on the palms, soles, scalp, forearms, throat and penis. This is described in detail. "On the left forefinger, and scattered elsewhere on the palmar aspects of the fingers, were pinhead-sized and large-sized conical, papular reddish spots, with central horny plugs. As the central plugs fell out they left a depressed central pit." This condition, it is noted, has been described by CASTELLANI. The serum obtained from the surface of the skin lesions showed spirochaetes with the morphologic appearance of *S. pallida*. Blood-culture was negative. Intramuscular injection into rabbits with an emulsion from one of the lesions was positive and the strain has been carried through four transfers. In a nodule which was removed from the arm for study, the intracellular spaces were infiltrated with polymorphonuclear leucocytes, and in one area a distinct miliary abscess was visible on a level with the summits of the papillae; in this abscess seven or eight spirochaetes were seen in the Levaditi stained sections.

The table illustrates the effect of treatment on the Wassermann reaction. After the first injection many of the lesions disappeared, and after a second the remainder became completely resolved, but the reaction was slow to become negative.

WASSERMANN REACTION.

Date.	Cholesterolized.	Antigens. Alcoholic Syphilitic Liver.	Acetone Insoluble Lipoids.
Jan. 2, 1920	++++	++++	++++
Jan. 9, 1920	++++	++++	++++
Jan. 16, 1920	++++	++++	++++
Jan. 22, 1920*	++++	++++	++++
Feb. 1, 1920	++++	++++	++++
Feb. 5, 1920*	Test	not performed.	
Feb. 13, 1920	++++	++++	++++
Feb. 22, 1920	++++	++++	++++
Feb. 26, 1920	++++	+++	++++
March 4, 1920	+++	++	+++
March 19, 1920	+++	++	++
April 2, 1920	+++	++	++
April 9, 1920	+++	++	++
April 14, 1920*	Test	not performed.	
April 19, 1920	+++	++	++
July 8, 1920	+	Neg	Neg.

* 0.9 gm neo-arsphenamin given intravenously.

The parasitology is discussed at length with special reference to syphilis. The spirochaete was found most difficult to stain; the best results were obtained with the anilin black stain of ROSENBERGER and FANZ. In the discussion, LINDENBERG, of São Paulo, Brazil, attached great importance to the fact that in yaws the spirochaete is found in the connective tissue and in syphilis not. The finding of the organisms in the miliary abscesses he considers specific for yaws.

A. G. B.

MAUL (Herman G.). **Bone and Joint Lesions of Yaws with X-Ray Findings in Twenty Cases.**—*Philippine J. Sci.* 1918. Mar. Vol. 13. No. 2. pp. 63-77. With 7 plates.

The author writes :—

" In the majority of cases the lesions show as rarefied areas, irregularly oval or elliptical in shape with the long axis parallel to that of the bone in which the lesions are located. The size varies from the smallest discernible area to one that is two or three centimeters in length. The rarefaction presents moderately well-defined borders separating it from the unaffected bone and varies in translucency from the slightest differentiation of unnatural transparency to one simulating a perforation. Most of the lesions appear to originate in the interior of the bone, while a number can be seen as small excavations on its outer surface. When the lesion is on the surface of the bone, the periosteum is usually destroyed, but occasionally the cortex shows thickening, and the periosteum is separated from the bone. . . .

" In the chronic lesions marked irregularity of the bony outline is evident, and the picture characteristic of the earlier lesions is more or less lost. The bone as a whole becomes deformed, and the growth of the bone is interfered with both in length and breadth. This dwarf-like picture is most frequently noticed in the cases showing the lesions in the epiphyses. Within the joints the destruction is most frequently seen on the parts of the articular surfaces most exposed to trauma, as oval or irregularly shaped excavations, making the outline of the articular surface rough and uneven."

The X-ray picture differs from that of syphilis in that (1) the periosteal proliferation is absent; and (2) the thickening of the cortex of the bone is absent [exceptions are noted].

The shaft of the bone is the most frequent location of the lesion—80 per cent. of cases; the epiphyses or articular surfaces are affected in 20 per cent. Of bones the tibia was most frequently affected, and other bones in the following order of frequency: tarsal bones, fibula, phalanges, metatarsals, metacarpals and radius, patella and humerus, femur and ulna, etc. The lesions were multiple in 75 per cent. of the cases. The time between the appearance of the primary lesion and bone lesions varied from six months to nine years, with an average of 2½ years. The cases were observed for five months after treatment, and radiographs were taken at monthly intervals. The clinical and subjective symptoms vanished long before the radiographs showed the bone lesions to have disappeared. The histories of several cases are given.

The conclusions are as follows:—

" 1. The majority of cases of yaws with bone and joint involvement shows characteristic X-ray lesions.

" 2. The radiograph can be used as an additional means of differentiating yaws from syphilis, when there is involvement of the bone, and as a confirmation of the evidence that the two diseases are distinct.

" 3. The pains complained of in the joints are due, in most part, to the presence of the lesions on the articular surfaces.

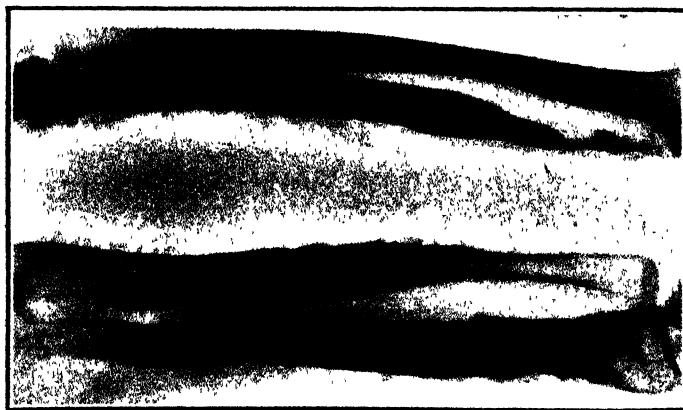
" 4. Twenty per cent. of patients infected with yaws develop bone or joint lesions when not treated.



Pl. ii, Fig. 1. Shows characteristic joint lesions on the articular surface of the bone involved. [Case 1. Filipino, 8 years old: primary lesion in infancy: X-ray pictures showed 19 bone lesions. Considerable regeneration followed Castellani treatment.]



Pl. iii. Fig. 1 Shows contracture on flexure surface of second finger of right hand. Multiple bone lesions. Large cutaneous lesion and thickening of soft tissues on the palmar surface of index finger of right hand. [Case 3. Filipino, 15 years old: primary lesion 1911: severe pains in all joints 6 months later, persisting for 4 years. During this period soft tissues of middle finger of hand became contracted. X-ray survey of the bones in 1917 revealed 52 bone lesions. After 0.4 gm. salvarsan relief of symptoms "marvellous," and regeneration of lesions was eventually complete.]



Pl. vii. Fig. 3. Shows chronic bone lesions of yaws with deformity. Case from Drs. FERNANDEZ and ARGÜELLES.

[The figures are reproduced from *Philippine Journal of Science*, Vol. 13 B. No. 2.]

" 5. Regeneration of the bone is complete at the site of the lesion, if the destruction has not been too great.

" 6. The Castellani treatment causes a gradual disappearance of the bone and joint lesions.

" 7. Salvarsan is a specific in these cases, and rapid regeneration of bone follows its use."

A. G. B.

SCHMITTER (Ferdinand). **The Aetiology of Gangosa and its Relation to Papulo-Circinate Yaws.**—*Jl. Trop. Med. & Hyg.* 1921. Sept. 1. Vol. 24. No. 17. pp. 229-231. With 1 text-fig.

The author suggests that gangosa, and similar tropical ulcerations, constitute a late stage of papulo-circinate or "syphilitic" yaws, which again is a variety of yaws differing from raspberry yaws.

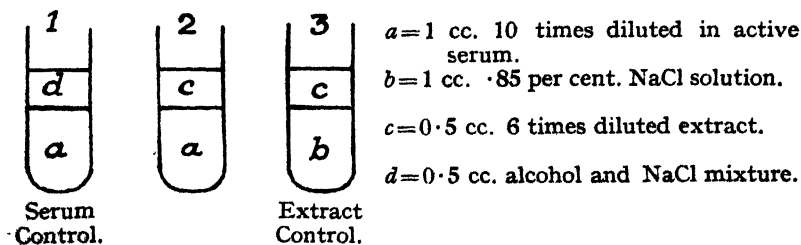
The paper is not convincing. Its contents were included in another published by the author in 1914, though this does not figure in the 19 references given and no allusion is made to it in the text [see this *Bulletin*, Vol. 4, p. 408].

A. G. B.

DE RAADT (O. L. E.). **De reactie van Sachs-Georgi bij framboesia tropica.** [The Sachs-Georgi Reaction in Yaws.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1920. Vol. 60. No. 2. pp. 313-317. With 1 text-fig.

The author quotes MÜNSTER, SCHRÖDER, FRÄNKEL and MERZWEILER on the reliability of the Sachs-Georgi as compared with the Wassermann reaction. As the Sachs-Georgi reaction is much less complicated than the Wassermann and appears to rival it in point of reliability, its advantages in tropical practice are obvious. The first essential is a reliable extract. This the author prepared according to the method described in the *Deutsche Med. Wochenschr.*, 1918, No. 49, p. 1349:—

Twenty gms. of fresh bullock heart are extracted for about 14 days with 100 cc. of absolute alcohol. The extract is filtered until quite clear. To each 10 cc. are now added 20 cc. absolute alcohol + 1.5 cc. of a solution of cholesterine in absolute alcohol. The reaction with this extract is carried out as follows: The serum to be examined is, after heating to 55-56° C. for half an hour, diluted with 10 times its volume of 0.85 per cent. NaCl solution. 1 cc. is then introduced into each of two test tubes, 1 cc. of 0.85 per cent. NaCl solution being introduced into a third. The extract is now diluted with 6 times its volume of 0.85 per cent. NaCl solution and 0.5 cc. of this dilution added to each of tubes 2 and 3, while to tube 1 is added 0.5 cc. of a mixture of one part absolute alcohol with 6 of 0.85 per cent. NaCl solution. See Fig.



The three tubes are now incubated at 37° C. for 7 hours, kept for a night at room temperature and examined next day with an agglutinoscope

or a magnifying glass. If the reaction is positive flocculi will be seen in tube 2 while tubes 1 and 3 remain clear.

The author gives the results of his examination of 239 cases :—

A. 80 persons with clinical framboesia—

Positive 70 = 87·5 per cent.

Negative 8 = 10 „

Positive with simultaneous flocculations in the serum-control tube 2

B. 15 persons with clinically cured framboesia—

Positive 14 = 93·33 per cent.

Negative 1

C. 9 persons with clinical lues or suspected of lues—

Positive 9 = 100 per cent.

D. 135 persons with other diseases, *e.g.*, malaria, pneumonia, dysentery, tuberculosis, etc., and also apparently healthy persons—

Positive 5

Negative 130

“It would appear from the foregoing,” says the author, “that the serum reaction of Sachs-Georgi gives a positive result in the great majority of cases of framboesia tropica and may therefore be regarded as a sensitive test for this disease, even in cases apparently cured.”

F. S. Arnold.

HALLENBERGER. Die Framboesia tropica in Kamerun. Ausführungen ueber die Histopathologie der geschwürigen frambösischen Spätformen und der Rhinopharyngitis mutilans und deren Abgrenzung gegen tertiäre Syphilis. [Yaws in the Cameroons. The Histopathology of the Ulcerative Late Forms of Yaws and of Rhinopharyngitis mutilans and their Differentiation from Tertiary Syphilis.]—*Beihefte z. Arch. f. Schiffs- u. Trop.-Hyg.* 1916. Sept. Vol. 20. No. 3. 35 pp. With 10 plates.

Every tropical physician recognizes, the author writes, that yaws consists not merely in polypapillomatosis, but also in a variety of disease forms affecting the skin, bones, joints and perhaps also the mucous membranes, forms which are at times indistinguishable from those of syphilis. That the two diseases are distinct was proved by NEISSER's experiments on monkeys. Whereas a diagnosis between syphilis and yaws is as a rule possible in the early stages, with or without a histological examination of a lesion, in the late forms it is not always possible on clinical examination in a country where both affections are found. If the structure of a syphilitic condyloma and that of a yaw papilloma be compared it is found that the epithelial proliferation of the latter far exceeds that of the former, but this and other usual differences are not without exception. The only constant difference is the classical syphilitic change in the vessels, shown in the condyloma as in every other syphilitic manifestation. This change is not found in rhinopharyngitis mutilans; hence its syphilitic origin is excluded.

A feature of this monograph are the admirable photographs, displaying well all the clinical forms of yaws, as well as the histology.

A. G. B.

GUERRERO (L. E.), DOMINGO (E.) & ARGÜELLES (M.). **Further Observations on the Treatment of Yaws with Castellani's Mixture.**—*Philippine Jl. Sci.* 1918. July. Vol. 13. No. 4. pp. 191-197. With 2 plates.

CASTELLANI's mixture and its uses were described in this *Bulletin*, Vol. 9, p. 257. The authors have employed it in 43 cases. On the first day one-third dose was given three times, on the second one dose twice, and subsequently one dose thrice. A total of 15-80 doses was necessary and a space of time from 5-27 days. Of the 36 cases in which the treatment was not broken off, 24 completely recovered, 7 showed improvement, 7 showed no improvement, and 5 had relapses; it is not stated how long the cases were followed. Protocols of 16 cases follow. CASTELLANI's conclusions are confirmed: "the cure of recent infections . . . is nearly as marvellous as that by salvarsan." The tendency of the mixture to cause emesis and iodism may be corrected, the former by increasing the sodium bicarbonate or by the exhibition of paregoric, the iodism by epinephrine. The plates show photographs of cases before and after treatment; [some of these are evidently transposed].

A. G. B.

VAN NITSSEN (R.). **Action du sulfate de cuivre ammoniacal dans le pian.**—*Ann. Soc. Belge de Méd. Trop.* Brussels. 1920. Nov. Vol. 1. No. 1. pp. 55-59.

The ammoniated sulphate of copper [? cuprammonium sulphate] was prepared on the spot (Belgian Congo) and was first tested on rabbits. It was afterwards given to native yaws patients intravenously in the doses used by J. MAUTÉ in Morocco (*Presse Médicale*, 1918, July 22) in 4 per cent. watery solution. Later the doses were 10, 20, 25, 30, 35, 40 cgm. at intervals of 48 hours. Twenty patients were thus treated: in 5 at the second period the lesions vanished after total doses of 1.77 gm. to 3.0 gm.; in 15 at the third period there was 1 failure, 2 improved and 12 cicatrizations, in 3 of which there was relapse; 0.7 to 3.88 gm. were employed. The injections are well borne and can be continued for six weeks or more. The treatment gives apparent cures only; it does not protect from relapse.

A. G. B.

HEAT STROKE.

FIGUERAS BALLESTER (D. Luis). **Insolacion y Acaloramiento: Inmunidad de la Raza Negra.** [Immunity of Black Races from Sunstroke and Heat Asphyxia.]—*Siglo Medico*. 1921. Mar. 26; Apr. 2. Vol. 68. Nos. 3511 & 3512. pp. 286-290; pp. 315-316.

The author reviews the theories of causation in these two pathological conditions and arranges them as follows:—

Theories based upon	{	Infection	{ exogenous. endogenous.
		Asphyxia	{ primary. secondary.
	{	Auto-intoxication	{ primary. secondary.
		Destruction of	{ formed elements of the blood. nervous tissues.

We may dismiss exogenous infection; but an auto-toxin, formed from destroyed blood elements, or nerve substance, may be present. Toxins in the blood, such as those from muscular fatigue, would be poisonous; and, during heat asphyxia, or any direct interference with the heat centres—as in sunstroke—there would be oxygen-hunger and excess of retained CO₂ [see this *Bulletin*, Vol. 11, pp. 169 *et seq.* Vol. 13, pp. 305-311, and Vol. 16, pp. 53-67]. Interesting as this long paper is, most of the factors considered have already been noticed in this *Bulletin*; even the main question with which Dr. Figueras Ballester deals—the difference in incidence between white and black races—will be found summed up in Vol. 16. On page 58 will be found a sentence beginning: “The black with his tissues protected by pigment,” etc.

J. H. Tull Walsh.

McINTOSH (John N.). **Heat Hyperpyrexia.**—*Brit. Med. J.* 1920. June 12. pp. 795-796.

The author describes the treatment of cases of heat stroke which occurred at Nasireych—May to August, 1916—when they “had not the luxury of electric fans or punkahs.” “We dug a trench 6 ft. long by 8 ft. broad and 4 ft. deep, and covered with reeds. The majority of cases of hyperpyrexia came into hospital between 4 and 6 p.m. The rectal temperature was never less than 108° F.”

As these cases arrived they were placed across the trench; 1-15 gr. of strychnine was injected and artificial respiration and lavage were employed. Relays of orderlies poured water over the patients. The trench quickly filled so that the patients were immersed except their heads. It was never safe to stop douching until the temperature remained fixed at, but never lower than, 101° F. An invariable sign of recovery was vomiting. As the patients became conscious they were removed to the hospital reed huts, and calico sheets were wrapped round them—head and trunk. Orderlies poured water over them, keeping the sheets wet. When the sun went down the same treatment was

continued in the open-air until there was a fall in atmospheric temperature, which occurred usually after midnight. On the following day, before it began to get very hot, every patient received an intramuscular injection of 3 gr. of quinine bihydrochloride; no instance of gluteal abscess or of sloughing occurred. No death occurred among 40 or more cases of this type treated by this method.

In one case choleraic symptoms appeared; hypertonic saline was injected; the temperature rose from subnormal to 108° F. The man died.

J. H. T. W.

PATTISON (E. Seton). **Notes on a Case of Heat-Stroke with Hyperpyrexia.**—*Lancet*. 1920. Oct. 9. p. 749.

The chief features of this case are :—

Male passenger, aged 36: attacked in the Red Sea, August 18th, 1920. Wet bulb 87°, dry bulb 90°. Became immediately unconscious with dilated pupils that did not react to light. Temperature in the axilla 110° F. (verified by three thermometers). Patient was massaged with blocks of ice for periods of 15 minutes and dried in the intervals with hot towels. After one hour the temperature dropped to 108°; at the end of the second hour it was 106·4°. An injection of strychnine and digitalin [dose not given] was given, and in another hour the temperature fell to 105°. Ice was discontinued. He developed violent convulsions, which continued for four hours. An injection of morphia and atropin was given and the patient got some sleep. Next day temperature rose to 106°, and ice massage was resumed. The temperature fell gradually and the man recovered. [*v.* WILLCOX & HILL, this *Bulletin*, Vol. 16, pp. 53-59.]

J. H. T. W.

MISCELLANEOUS.

FOWLER (James K.). **An Address on the Colonial Medical Service as a Career.**—*Lancet*. 1921. Apr. 9. pp. 729-734.

Here may be found a list of the colonies and protectorates to which medical officers are appointed by the Secretary of State for the Colonies, a brief statement of the conditions and prospects of the medical service in each, and a fuller account of the emoluments, privileges, pensions, and professional attractions of the medical services of West Africa and East Africa. Among the attractions, the varied opportunities of original work are rightly emphasized. The author sides with those who think that a miscellany of medical services devoid of a professional head personage in London, who himself has been through the mill, is not the best possible arrangement either for the individual services, or for the administrations served, nor yet for the far-reaching advancement of learning on which the control of disease and the healthy development of all parts of the empire depend; and he would like to see the colonial medical services unified, and organized and recruited on the model of other great medical services—the Royal Naval, the R.A.M.C., and the I.M.S.—with a head at the Colonial Office and a common entrance examination. With the adoption of this and other subsidiary measures for facilitating study, the author rightly believes that the colonial medical service might attain the highest status amongst the public medical services of the Empire.

A. Alcock.

HOBDAY (Frederick). **Observations on some of the Diseases of Animals Communicable to Man.**—*Lancet*. 1921. Apr. 2. pp. 726-728.

There is nothing particularly novel in this interesting lecture, the object of which is emphasize the fact, which is of importance both scientifically and from the practical preventive standpoint, of the existence of a considerable pathological territory common to human and veterinary medicine.

The diseases mentioned by the lecturer as communicable to man by animals are glanders (now, happily, nearly eradicated), anthrax, rabies, foot-and-mouth disease, several varieties of mange and of ringworm, tuberculosis, taeniasis, and trichiniasis.

A. A.

MEGAW (J. W. D.). **Indian Science Congress. Eighth Annual Meeting, Calcutta, 1921. Section of Medical Research, Presidential Address.**—*Indian Med. Gaz.* 1921. April. Vol. 56. No. 4. pp. 133-140.

The author notes that there is no accurate record of the distribution of many of the preventable diseases of India, and suggests that such a survey should be made by motor or caravan. Little use has been made of the case-records written up in the medical schools and colleges; these should be kept on such a system as to allow the information to be tabulated and analysed at a central bureau; any medical man could participate in such an enquiry. A study of cancer as it occurs in Kashmir and India might lead to valuable knowledge. As to beriberi, he gives instances in which the deficiency theory does not fit, but he is not quite accurate in stating that the truth of this theory rests on the identity of the diseases in bird and man. He admits there may be more

than one variety of beriberi. With regard to diabetes and McCAY's work thereon, he suggests that a detailed enquiry into the habits of those classes which are most, and those that are least, affected may solve the problem as well as bring the solution home to the people. Infantile cirrhosis and goitre are other diseases which need study on the spot. As the author expresses it, we should look at the problems with the naked eye as well as with the microscope. He considers that if all our knowledge of prevention of disease in India were put into practice the average duration of human life would be doubled, and stresses the value of education of Indian children. Finally, he advocates the appointment of a committee, indicating the qualifications of its personnel, to consider what action should be taken to put medical research in India on a sound basis, what steps would ensure the most effective co-operation between medical and other forms of scientific research, and what should be done to make the results of medical research available for the improvement of the physical, intellectual and economic conditions of the people of India.

A. G. B.

VERHOEF (A. W.). **Onderzoekingen naar aanleiding van het Cholesterol-gehalte van het bloed bij verschillende rassen.** [Researches on the Cholesterol Content of the Blood in Different Races.]—vi+56 pp. With 3 text-figs. 1920. Utrecht: P. den Boer.

After referring to the work of DE LANGEN and others, who found the cholesterol content lower in natives of Java than in Europeans, 0·088 per cent. and 0·170 per cent. respectively, due, according to DE LANGEN, not only to difference of diet but in part to a gradually acquired function of the endocrine glands, the author recounts experiments on himself and dogs, and comes to the conclusion that in the face of his high percentages, 0·181-0·182 per cent. in Indonesians having lived for some time in Europe, DE LANGEN's endocrine theory is unconvincing.

In the author a fat-free diet reduced the cholesterol content by 20 per cent., in the dog 30 per cent. DE LANGEN's figures show a debit of 50 per cent. in natives. The difference is 20 per cent. and more is thus still unaccounted for. The author therefore assumes a still unknown factor—possibly climate. As SCHUT found the difference in the sugar content of the blood to be due to this cause, he suggests the possibility that further research may prove climate to have a similar effect on the cholesterol content. Research in this direction should be undertaken in India itself: (a) on persons living in the same climate on different diets; (b) in different climates on the same diets; or, in other words, comparative statistics are needed of natives and immigrants on the "coast" and in the "hills." *Length* of residence may also play a part.

J. Campbell Graham.

ARKWRIGHT (J. A.), ATKIN (E. E.) & BACOT (A.). **An Hereditary Rickettsia-like Parasite of the Bed Bug (*Cimex lectularius*).—Parasitology.** 1921. Mar. Vol. 13. No. 1. pp. 27-36. With 1 plate and 1 text-fig.

In attempting to infect bed-bugs with the virus of trench fever, by feeding them on suitable patients, the authors found in smears from the gut of these insects thread-like bacteria with shorter rod-like forms, and in some cases coccal or diplococcal bodies suggestive of the Rickettsia

found in lice from trench fever patients. Afterwards, these minute bodies were found in bugs that had fed only on healthy men, in newly-hatched bugs that had not fed at all, in bug's eggs taken from the ovary, and in smears of unhatched bugs, until finally the authors reached the conclusion that heavy infection with this parasite must be very general among bed-bugs.

The new-discovered parasite and its intracellular multiplication and development are described and figured. Smears of embryos and of various organs from older bugs show minute coccid, diplococcal, and lanceolate forms, the last exhibiting transitional changes to bacterial forms and rods. In certain enlarged cells of the Malpighian tubules—and apparently only there—the thread-like forms appear at full length. By dark-ground illumination the threads have been observed to discharge granules which the authors consider to be identical with the *Rickettsia* bodies that first attracted their attention.

The parasite was observed in bugs from several British sources, and from Warsaw, and also in a few specimens of *Cimex hirundinis*.

The paper begins with a general account of the characters of the *Rickettsia* genus and some critical and historical remarks on the nine declared *Rickettsia* species.

A. A.

BACOT (A.). ***Rickettsia* in the Bed-Bug ; Demonstration.**—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1921. Jan. 21. Vol. 14. No. 5. p. 92.

The demonstrator explained that the *Rickettsia* bodies show resemblances to bacteria, resemblances which in the absence of successful culture have not yet been interpreted. The species found in the bedbug resembles that found in the sheep-keel, and also in its development exhibits resemblances to *R. prowazeki* of typhus fever ; in addition to the diplococcoid form it shows rod-like and thread-like phases ; it passes to the bug by hereditary transmission, and so far as is known has no second host. Apparently all individual bedbugs are infected.

A. A.

MAYER (M.). **Ueber einige bakterienähnliche Parasiten der Erythrozyten bei Menschen und Tieren.** [On some Bacteria-like Parasites of the Erythrocytes of Man and Animals].—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 5. pp. 150–152.

This is an argument regarding the nature of certain inclusions in the red blood cells of vertebrates—Grahamella, Bartonella, etc.—generally regarded as parasites. The author found in rats and a guinea-pig just recovered from a severe trypanosome infection numerous rods, like but even smaller than Bartonella, and dumbbell forms reminiscent of *Rickettsia*, the blood-picture being that of a grave anaemia similar to that of Oroya fever. These forms might be conceived as representing degeneration-changes in the red cells, or as an outburst of some latent infection ; in the latter case the author would propose, under reservation, the name of *Bartonella muris*. The question then arises whether in the pernicious anaemia of man, where scanty and transient inclusions of a similar kind occur, there may not be some element of infection or excitation of infection. Finally the author refers to the suggestive bacteria-like parasites (*Bacillus krusei*) of the

frog described by KRUSE, and the vacuole-like inclusions associated with them, to which the name *Cytamoeba bactifera* was given. Here, however, the cultivation of undoubted parasites has not been successful.

A. A.

WYLER (E. J.). **Observations on the Wassermann Test, using a Method of Prolonged Fixation at Ice-Chest Temperature.**—*Jl. Path. & Bact.* 1921. July. Vol. 24. No. 3. pp. 349-354.

It has long been known that fixation of complement is profoundly influenced by temperature, and the present paper gives the results of more than 700 experimental comparisons of the method of fixation at ice-chest temperature devised by GRIFFITH and SCOTT (*Ministry of Health Rep. Public Health & Med.*, No. 1, 1920) with the method in routine use at the Military Hospital in Rochester Row (*Med. Res. Comm. Rep. Pathol. Meth.*, 1918, No. 1). Taking the comparisons as a whole, 74.4 per cent. gave the same results by both methods, 23.2 per cent. showed less fixation by the routine method, and 2.2 per cent. showed less fixation by the cold method. Taking some of the comparisons conditionally, it was found (a) that in 224 recently well-treated cases the method of cold fixation gave a much higher proportion of positive results than the said routine method; (b) that in 100 untreated cases the cold fixation method is not appreciably more sensitive, and is sometimes less sensitive; and (c) that in 238 cases sent "for diagnosis" the cold fixation method showed no marked superiority.

A. A.

SARKAR (Sarasi Lal). **A Peculiarity in the Spleen Rate as observed in the District of Chittagong Hill Tracts.**—*Indian Jl. Med. Res.* 1921. Apr. Vol. 8. No. 4. pp. 700-714. With 2 charts.

The spleen rate in the Chittagong Hill Tracts varies in different parts from about 40 to 75 per cent. In a curve representing examinations of 2,178 indigenous children the percentage rises up to the third year of life and then falls steadily to the age of 12. A somewhat similar phenomenon is revealed in Ross's records from Mauritius. But in the descendants of certain immigrants from the plains who settled in the Hill Tracts from 50 to 100 years ago the curve is different, and spleens of a large size are relatively more numerous.

A. A.

BLANCHARD (Raphael). **Notices Biographiques. XXIV. Louis-Daniel Beaupérthuy, 1807-1871.**—*Arch. de Parasit.* 1919. Oct. 31. Vol. 16. No. 4. pp. 503-545. With 9 text-figs.

The interesting documents here collated reveal BEAUPERTHUY as one of those great original men who, if they do not soar with certain flight to undiscovered realms of knowledge, at any rate have visions of things beyond the reach of their contemporaries' thoughts.

BEAUPERTHUY was born in Guadeloupe in 1807 and came to Paris to graduate in arts and to study medicine in 1828. In the early years of his subsequent professional life he was in commission from the Paris Museum as a "voyageur naturaliste" in Venezuela and neighbouring territories; and in 1841, his mission over, he settled

in practice in Venezuela. Subsequently, having acquired fame by his work on leprosy, he removed to British Guiana and was appointed director of the leper-asylum at Demerara, where he died in 1871.

In his ideas as to the causation of the notorious diseases of tropical regions Beauperthuy was a worthy pioneer of the science of to-day, since he realized that there must always be a pathogenic agent, though it might be imperceptible to the unaided eye, and he saw quite distinctly that biting insects were at work inoculating some kind of morbid material.

In Yellow Fever he saw the "Tipulids" injecting a venomous haemolytic liquor under the man's skin, though he thought that the venomous property must be derived from the fishy matter on which the insects fed. In Malaria, again, he understands that it is not the merely humid air of the marshes, but the presence of "Tipulids" there that makes the marshes unhealthy; miasma is a chimaera, the ultimate cause of malaria is something that germinates and is transmitted by inoculation. All this, and much other interesting detail, is set down by the lamented author of this posthumous publication.

A. A.

FRANÇA (Carlos). **An Early Portuguese Contribution to Tropical Medicine.** (Translated and Communicated by Clifford Dobell.)—*Trans. Roy. Soc. Trop. Med. & Hyg.* 1921. Mar. 18 & May 20. Vol. 15. Nos. 1 & 2. pp. 57-60.

The contribution in question was one by a Portuguese colonist, Gabriel SOARES DE SOUZA, in 1587. In a description of Brazil he correctly stated the mode of conveyance of yaws from man to man—by small flies which feed on the sore and then settle on skin abrasions of the healthy—thereby anticipating the proof brought by CASTELIANI 320 years later. Amongst other mentions of early contributions of the Portuguese to tropical medicine is one showing that the chigoe flea in the sixteenth century existed not only in Brazil but also in India, where it was called *nigoa* (Gaspar AFFONSO, 1596).

A. G. B.

TIJSSSEN (J.). **Onderzoekingen over Oleum Chenopodii van verschillende herkomst.** [Researches on Chenopodium Oil of Different Origins.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 1. pp. 79-96.

The author prepared the oil by distillation of wormseed cultivated by himself in Sumatra. This oil (spec. gravity 0.913) was tested by giving it to patients in doses of 16 drops three times, followed after six days by a course of American chenopodium oil in the same dosage. It proved to be very efficient and not inferior to the heavier sorts of oil. FLU, DE LANGEN and WEEHUIZEN (*Geneesk. Tijdschr. v. Nederl.-Indië*, 1918, Vol. 58, p. 820) concluded from their experiments that the heavier parts of the oil (ascaridol) contained the vermifuge element. Tijssen found, after separating the lighter and heavier parts of the oil, no difference of any importance between their vermifuge effects. Specific gravity and other physical properties of the oil may differ greatly without interfering with the vermifuge action of the drug.

W. J. Bais.

GONZAGA (A. Gavião). **Contribuição ao saneamento do Nordeste.—**
Brazil Med. 1921. Mar. 12. 35th Year. Vol. 1. No. 11.
 pp. 134–135.

Notes on the regional nosology of the State of Rio Grande do Norte. The author divides the State into three zones, littoral, rural belt and interior. Helminthiasis are very prevalent. Of 1,235 examinations of faeces made by the author 513 showed the presence of intestinal parasites. *Schistosomum mansoni* was found five times, once alone and four times in association with other parasites. *Gigantorhynchus gigas* was found twice. *Amoeba dysenteriae* was found alone in ten cases and in eight associated with various helminths. The inhabitants of the interior were found to suffer much less from intestinal parasites than those of the other two zones, a fact which the author attributes to its much lower density of population. Leishmaniasis was not found. Malaria is only locally prevalent and is confined to the littoral and rural belt zones. Tuberculosis is rare, especially in the zone of the interior, where the climate is healthy and the consumption of alcohol is trifling as compared with that in the interior of the southern states of Brazil. Leprosy is rarer still, almost all the cases found hailing from Amazonas or Pará. Syphilis is exceedingly prevalent.

F. S. A.

LIVINGSTON (A. E.). **The Comparative Toxicity of Thymol and Carvacrol (Isothymol).**—*Public Health Rep.* 1921. June 10. Vol. 36. No. 23. pp. 1317–1331. With 1 chart in text.

The author details some of the unpleasant symptoms which have followed the administration of thymol and chenopodium oil, indicating that new or additional specifics should be sought. Till recently carvacrol, an isomer of thymol, could not be produced cheaply, but recently it has been prepared on a large scale from spruce turpentine, itself obtained in large quantities as a by-product in the manufacture of wood pulp. Its source of supply is therefore assured and the raw materials are inexpensive. It is a liquid at body temperature, which improves its chance of coming in contact with the intestinal wall.

For the experiments 109 rabbits were used and the results are expressed in tables. It is concluded that the toxicity of thymol and carvacrol on rabbits is essentially the same. It was shown besides that in the toxicity of the two drugs as tested on paramecia there was no striking difference and the relative anthelmintic value in tests on earthworms was practically the same.

A. G. B.

BASU (Charu Chandra). **Observations on the Chemical Behaviour of Malarial Pigment, with a Note on the Nature of Pigment found in the Liver of Kala-Azar Cases.**—Reprinted from *Indian Jl. Med.* 1921. Mar. Vol. 2. No. 1. pp. 328–331.

The author was not able to demonstrate iron in malarial pigment, from livers and brains of pernicious malarial cases, by microchemical methods, but malarial tissues preserved in Kaiserling mounting solution, when suitably treated, yielded a dark coloured solution which showed definite haematin bands. Kala azar livers were often pigmented; the pigments behaved chemically like malarial pigment, but the distribution is different—in the intercellular connective tissue and the liver cells, whereas in malaria it is confined to periportal tissue

and endothelial cells lining capillaries. Formalin fixed livers often show pigment free in the liver capillaries. These are haematin granules formed by the action of formaldehyde on haemoglobin. They respond to the tests for malarial pigment and can be only differentiated from the latter by their distribution.

A. G. B.

PIRIE (J. H. Harvey). **Blood Testing Preliminary to Transfusion, with a Note on the Group Distribution among S.A. Natives.**—*Med. Jl. S. Africa*. 1921. Jan. Vol. 16. No. 6. pp. 109–112. With 2 text-figs.

A clear account is here given of the blood testing preliminary to transfusion, an essential process, because serious and even fatal haemolysis has sometimes followed blood transference. SHATTOCK and LANDSTEINER in 1900 found that the serum of certain persons produced clumping of the red cells of certain others, i.e. iso-agglutination. Such persons were divided into three groups according to their reactions but, later, MOSS showed that there was a fourth group.

MOSS'S GROUP CLASSIFICATION.

Serum.	Cells.				No. of Individuals in group.
	Group I.	Group II.	Group III.	Group IV.	
Group I ..	0	0	0	0	I.= 5 per cent.
Group II ..	+	0	+	0	II.=40 ..
Group III ..	+	+	0	0	III.=10 ..
Group IV ..	+	+	+	0	IV.=45 ..

+ = Agglutination.

0 = No agglutination.

Haemolysis practically always occurs synchronously with agglutination. Transfusion can be made free from risk if the action of the recipient's serum on the erythrocytes of the proposed donor is ascertained beforehand, and this can readily be done by finding to which group both donor and recipient belong. The action of the donor's serum on the recipient's cells is hardly appreciable and can be ignored. The blood of a donor belonging to the same group as the recipient, or belonging to Group IV (the cells of which are not agglutinated by any of the serums) can then be collected for transfusion.

For testing, one requires a small stock of Group II and Group III sera, glass slides and a needle. The reaction of a drop of serum with a smaller drop of blood is studied on a slide. According to whether both sera, or No. III only, or No. II only, or neither agglutinate, reference to the table will show that the person belongs to Group I, II, III or IV. A donor of Group IV is a "universal donor." Donors

must, of course, be free from syphilis and malaria. For the method of transfusion the reader is referred to ROBERTSON.*

The generally accepted hypothesis to explain the facts given above is that there are two distinct normal human iso-agglutinins in serum and two corresponding agglutinogens or cell-receptors in red cells. These produce the group distribution of human bloods according as both, one or other, or neither are present in the individual concerned. These iso-agglutinins and their receptors appear to be heritable qualities, the transmission of which follows the Mendelian law. The receptors of agglutinable properties of the cells are empirically designated A and B, the corresponding agglutinins a and b, and their distribution may be shown thus:—

	Group.			
	I.	II.	III.	IV.
Cells	AB	A	B	O
Serum	o	b	a	ab

L. and H. HIRSCHFELD examined blood from a large number of different races at Salonica in the war and found that the serological formula for any race was "surprisingly" in agreement with its geographical distribution. The nearer the race to Western and Central Europe the more A; the nearer to Africa and Asia, the more B. When the ratio A-B is called the biochemical race index, the index of Europeans lies between 4·5 for the English and 2·5 for the Greeks, the Asio-African type lies between 1·09 and 0·5 (Indian) and the Arabs, Turks and Russians are intermediate. Climatic factors, *per se*, did not explain the difference in group distribution. They put forward the assumption that "A" and "B" qualities had different geographical points of origin, indicating two biochemically different races of mankind, one of which probably originated in Central Asia, and the other in North or Central Europe.

The author examined the blood grouping of the South African natives to compare their index with that of the Senegalese, 0·8, examined by the HIRSCHFELDS. Of the 250 so far tested, "A" qualities are present in 28·8 per cent. and "B" qualities in 20·8 per cent., giving a race index of 1·4, which would place the South African native in the intermediate group; and the author recalls that the Bantu stock is believed to contain a considerably larger impregnation with Hamitic (Mediterranean) blood than the West African negro. The author states that he obtained his Group II and Group III sera from the Lister Institute.

A. G. B.

* ROBERTSON (Oswald H.). iv. Memorandum on Blood Transfusion.—*Medical Research Committee. Special Report Series, No. 25.* 1919. pp. 143-180.

BREINL (A.). An Inquiry into the Effect of High Wet Bulb Temperatures upon the Pulse Rate, Rectal Temperature, Skin-Shirt Temperature and Blood Pressure of Wharf Labourers in North Queensland.—*Med. Jl. Australia.* 1921. Apr. 16. Vol. 1. 8th Year. No. 16. pp. 303-312. With 1 chart in text.

The observations here recorded in detail were made on men doing manual labour under natural conditions during the hot months in Townsville. About 180 men were examined, and for comparison observations were carried out on men loading frozen meat at a temperature below freezing point.

The observations show that with the higher wet-bulb readings there is a tendency for the rectal temperature to rise and remain high, though even with the wet bulb at 30° C. the averages of rectal temperatures were only between 37·7° and 38·3° C. The "skin-shirt temperature" (i.e. the temperature recorded by a thermometer placed under the shirt and kept from contact with the skin by a wire cage) did not vary greatly, but was much lower in the men working in the freezing room.

The average pulse-rate did not show constant variations, perhaps it was slightly higher on hot days. The average systolic blood-pressure—which the diastolic pressure closely followed—did not show constant changes beyond a tendency to fall with the progress of the day and the concomitant profuse sweating.

A. A.

BERCOVITZ (Nathaniel). American Children in the Tropics.—*Jl. Amer. Med. Assoc.* 1921. June 11. Vol. 76. No. 24. pp. 1649-1651.

The author, writing from the American Presbyterian Hospital at Hainan, South China, notes that of 16 children born to American missionaries during the last seven years all are alive and well to-day. Chinese infants and children in the island suffer from infantile tetanus, smallpox, malaria, hookworm, and dysentery, especially of the amoebic type. Against all these the American child has to be guarded and in addition he has to combat the great heat. The problems of feeding of infants are discussed; fresh cow's milk is not obtainable. It is stated to be impossible, owing to the heat, for a child to play outside between eight in the morning and five in the afternoon. The climatic conditions produce prickly heat and boils, and abdominal chill is brought about by sudden breezes which spring up. Change to a cooler climate for part of the hot season quickly restores vigour. Following malaria, the greatest cause of discomfort is the round worm, for which *santonin* is specific. Measles and whooping cough are found, but not scarlet fever, rheumatic fever or diphtheria. Colds and sore throats are common and a mild form of tonsilitis.

The author finds that healthy American children can be brought up in Hainan provided that the houses give plenty of space, good ventilation and proper screening protection; that the mother is prepared to exercise ceaseless vigilance in co-operation with the physician; that good medical care is available; and that yearly changes to a cooler climate are possible for both mother and children.

• A. G. B.

DUFOUGERÉ (W.). **De l'utilisation rationnelle de la main d'œuvre pénale en Guyane.**—*Bull. Soc. Path. Exot.* 1921. May 11. Vol. 14. No. 5. pp. 258-265.

This paper is not meant as an indictment of the administration of the French penal settlement in Guiana so much as a plea for turning the convict labour there to fruitful purpose. It is argued that although the climate of French Guiana has an evil reputation, it is not—apart from preventable malaria—more unhealthy than other tropical climates, and that so far as the ordinary civil population is concerned its evil reputation is undeserved.

With the convict population, however, the state of things is very different. There the morbidity and mortality are something appalling, being due chiefly to malaria and ankylostomiasis.

The author makes some very reasonable sanitary recommendations, including suggestions for an improved scale of diet; and he very justly argues that if these were adopted, and if also convicts who work properly were rewarded, so that they could procure a few small comforts and luxuries of food, the health and also the moral tone of the penal settlement would be enormously improved, and the whole colony would reap the benefit in the form of useful public works.

[Anyone who remembers the great convict settlement in the Andamans—at any rate as it was in the eighties and early nineties—will support the author's argument. There it was almost a comfortable sight to see a mass of more or less damaged and tarnished humanity being worked into an orderly industrial association without any obtrusive display of the big stick.]

A. A.

BATTA (G.). **Une plante médicinale brésilienne : *Davilla rugosa*.**—*Arch. Méd. Belges.* 1921. Jan. Vol. 74. No. 1. pp. 15-20.

Davilla rugosa, belonging to the order Dilleniaceae, is astringent and analgesic. In the treatment of orchitis, haemorrhoids, and other conditions of painful and inflammatory stasis, it is said to be superior to belladonna, hamamelis, and mercurial ointments. Originally the boiled or bruised leaves were used as a sort of poultice by empirics, but it is now recognized in the pharmacopoeia of Brazil in the form of an extract which is made up with an equal quantity of lanolin as an ointment, or is made into pills of 0.25 gm. for internal use. A liquid extract can also be made by infusion or preferably by decoction.

A. A.

EVERY (L.). **Some Impressions of a Regimental Medical Officer with Mounted Troops during Operations in Egypt and Palestine, 1914 to 1918.**—*Jl. Roy. Army Med. Corps.* 1921. June. Vol. 36. No. 6. pp. 456-459. With 2 text-figs.

The author would prefer that the regimental M.O. should have his stretcher-bearers posted from the field ambulance instead of allotted from the regiment by the C.O. He gives a design of a folding stretcher, to be built of bamboo and to weigh about 10 lb., suitable for mounted troops moving too quickly for the medical cart. He utterly condemns the Maltese pattern of medical cart: on a good road it is possible, on a rough road a nuisance, and so on a steep road absolutely dangerous, as it has no brakes and only one horse to steady it: moreover, it is impossible to get at the panniers without unloading the whole cart.

A four-wheel cart with two horses is the right thing, and it should carry a pack saddle, so that when its progress is stopped the more important contents can be carried on by one of the horses. The Rapid Transit Galloping Ambulance can follow mounted troops almost anywhere, and though light will stand anything. A standard syringe would be a blessing and a great economy; at present there are seventeen or more different sorts and sizes of hypodermic and serum syringes in use, so that one may possess the component parts of a dozen without being able to make up one than can be worked. The author invites attention to and discussion of all these points.

A. A.

DE RUDDERE (A.) **Le service sanitaire belge pendant la campagne de l'Est-Africain allemand.**—*Arch. Méd. Belges.* 1921. May. Vol. 74. No. 5. pp. 387-399. With 1 plate.

To the information published by RODHAIN [see this *Bulletin*, Vol. 14, p. 236] the author does not add much. The mortality of the porters in the East African campaign, as RODHAIN showed, was five times that of the troops. In justification of the employment of black troops rather than white in such tropical campaigns the author records the losses of a force of Frenchmen who fought in Madagascar; they were as follows :—

Killed by the enemy	..	..	..	7
Wounded	..	..	..	94
Died of disease	..	..	..	5,600
Sick	..	..	..	15,000

In the East African campaign the British effectives (South Africans) were at one time reduced by 30 per cent., while the reduction of the Belgian effectives (natives) did not exceed 18 per cent.

A. G. B.

CURJEL (Dagmar F.) **The Reproductive Life of Indian Women.**—*Indian Jl. Med. Res.* 1920. Oct. Vol. 8. No. 2. pp. 366-371.

Considering that knowledge of the average age of the onset of puberty, its association with early marriage and the average duration of menstrual life among Indian women, is desirable for the correct treatment of the various morbid gynaecological conditions associated with these ages, the author caused enquiries to be made in many parts of India. The results were as follows :—

" (1) Among 489 Indian women, representing many different castes and races, the average age of the onset of puberty (catamenia) was 13·63 years. The age of onset of puberty for Indian women lies within the limits for European races.

" (2) The average age at marriage among the same women was 13·83 years. Early marriage does not appear to exert any appreciable influence on the onset of puberty, since the average age of onset remains practically constant among Mussulmans (140 cases), 13·64 years; Hindus (268 cases), 13·62 years; and Indian Christians (81 cases), 13·69 years; although the age of women at marriage among the last group, 16·82 years, is higher than among either Mussulmans, 13·84 years, or Hindus, 12·91 years.

" It is also noteworthy that the average age of onset among a group of unmarried women students (56 cases), 13·87 years, resembles the average age among the married women, 13·63 years. •

"(3) The average duration of menstrual (reproductive) life among Indian women (74 cases), 32·14 years, does not appear to differ materially from the limits for European races.

"The earlier age at marriage among Indian women does not appear to influence the duration of their reproductive or menstrual life as compared with European races."

A. G. B.

NÚÑEZ (M. F.). **Administration of Arsphenamin in the Tropics.** [Correspondence].—*Jl. Amer. Med. Assoc.* 1921. June 11. Vol. 76. No. 24. pp. 1697-1698.

"Throughout South America, Ravaut's method [concentrated solution] has been for years the practically universal mode of administration. A small 2 cc. syringe is used instead of the larger and less common one of 5 cc. The 2 cc. Lürer syringe with metal sterilizer case is of great convenience. It is conveniently heated with a small piece of cotton saturated with alcohol, or a couple of hexamethylenamin tablets.

"In difficultly accessible regions where freshly distilled water is unavailable, the physician simply takes water from a running stream (well or cistern water is less preferable, as it usually contains more minerals in solution and its freshness is not certain), which he filters through cotton, boils thoroughly, and cools by setting the container in a vessel of cool water. The syringe may be sterilized in the same water and withdrawn by a pair of forceps, the jaws of which have been sterilized by dipping in alcohol. Two cc. of the sterilized water is drawn into the syringe and injected into the ampule containing the neo-arsphenamin, the ampule being opened only when everything is ready for making the solution. The water is withdrawn and reinjected, and the ampule shaken until the drug is completely dissolved. The injection is given in the vein *immediately*, slowly, and with vigilance to prevent any of the highly concentrated liquid being injected into the tissues outside the vein. In case such an accident occurs, the needle is instantly withdrawn and the injection continued at another site. A syringe of sterile water is then injected into the area of extravasated drug to stop the pain.

"I have seen hundreds of injections given in this way, and the results have been in all respects as satisfactory as with the more elaborate and refined methods in vogue elsewhere. This reduces the administration of neo-arsphenamin to the simplicity of any intravenous injection, and places it in the hands of the most modestly equipped practitioner. I have witnessed its administration by the side of a jungle trail, on a river raft, on the counter of a country store and in the huts of the peons."

A. G. B.

DODDS (A. B.). **Compensation of Mine Native Labourers.**—*Proc. Mine Medical Officers' Assoc.* 1921. May. Vol. 1. No. 2. pp. 1-3 (Discussion pp. 3-5).

FREW (A.). **A Contribution to Symposium on Sepsis.**—*Ibid.* pp. 8-9.

HAWARDEN (S. A.). **Notes on Treatment of Sepsis.**—*Ibid.* p. 10 (Discussion pp. 10-15).

BUTT (H. T. H.). **[Contribution to Resumed Discussion on Sepsis.]**—*Proc. Transvaal Mine Med. Officers' Assoc.* 1921. July. Vol. 1. No. 4. pp. 5-14.

At a Meeting of the Mine Medical Officers' Association held in May, besides the papers the titles of which are given, a discussion took place on the refusal of natives to undergo necessary operations. A case was cited in which a native had given consent for an operation on himself. The native died and because their approval had not been obtained his relatives demanded and obtained compensation. The difficulty about

compensation is to secure uniformity of assessment of disability. It was generally agreed that some central authority was needed, at all events for all but cases in which small sums were in question.

Dr. ORENSTEIN cited the following instructions to unskilled or native dressers under Medical Officers of the Rand Mines group :—

" At each compound dressing station there should be provided two atomizers, one containing tincture of iodine (this atomizer must have rubber fittings), and the other 2½ per cent. carbolized oil (this atomizer must be of the oil spraying variety, such as the " de Vilbiss "). Stringent instructions to be issued to all dressers in charge of these stations to treat all minor wounds as follows :—

" (1) The wounds are not to be washed, or touched with the fingers in any way, except to remove foreign bodies by means of a clean swab dipped in antiseptic solution, or with clean forceps.

" (2) Spray with iodine the whole wound and the skin around it for at least half-an-inch.

" (3) After the iodine, spray the same surface heavily with the oil.

" (4) Cover with a piece of dry antiseptic gauze or dry boric lint.

" (5) Cover this with a piece of clean cotton wool if necessary, and bandage.

" (6) Use iodine only the first two times the wound is dressed.

" (7) All dressings to be kept in clean vessels provided with tight lids."

Quite a different method is adopted for simple dressings at Randfontein, where 15,000 boys are employed. Dr. GONDIE had suggested the following procedure :—

" That the swab, which had been placed in a little Hycol solution, should be put on the wound, and the wound swabbed clean. The skin should be painted with a swab of iodine, and also the wound swabbed with it, and then the wound painted and thoroughly cleaned with another iodine swab. They then had a clear and clean area round the wound, and a more or less iodised coating. The dressing was then applied—white precipitate ointment, half-strength of B. P. That was spread on lint and placed on the wound after it was iodised. They used nothing else at all, and he must say that it had most astonishing results, was very cheap, and somehow seemed to keep the boys well. It seemed to keep out water and dirt to a large extent."

A. G. B.

TAYLOR (J. A.). **An Improvised Antiseptic Adhesive Dressing.**—*Jl. Trop. Med. & Hyg.* 1921. June 1. Vol. 24. No. 11. p. 155.

Ordinary adhesive plaster is apt to deteriorate in the tropics, and as a substitute guttapercha tissue and eucalyptus oil are here recommended, both articles being generally at hand. For a small clean wound the oil is applied direct and then the tissue. For wounds that require a dressing (or a bandage) the skin round the dressing is smeared with the oil and the tissue spread over all. To remove the tissue more of the oil is applied as a solvent.

A. A.

SNOW (William F.). **Transactions of the American Society of Tropical Medicine, Sixteenth Annual Meeting held at New Orleans, Louisiana, April 26 and 27, 1920. Contributions to Medical Science developed under the Auspices of the United States Interdepartmental Social Hygiene Board.**—*Amer. Jl. Trop. Med.* 1921. March. Vol. 1. No. 2. pp. 97–108.

The United States Interdepartmental Social Hygiene Board is the euphemistic title of the body, created by a law passed in 1918, whose

function it is to control syphilis and gonorrhoea, the agents of which the author calls "those great criminals of biology." He refers to the great prevalence of these diseases in the tropics and to the peculiar qualification of workers in tropical medicine, owing to their familiarity with laboratory and epidemiological methods, to promote the campaign against them, but the paper does not otherwise touch the tropics. It gives details of the principal researches promoted by the Board in the United States of America.

A. G. B.

MENSE (C.). **Die deutsche Tropenmedizin vor 25 Jahren und später.**—[German Tropical Medicine 25 Years Ago and After.]—*Arch. f. Schiffs- u. Trop.-Hyg.* 1921. Vol. 25. No. 1. pp. 2-13.

ZIEMANN (H.). **Einfluss der Tropenmedizin auf die medizinische Wissenschaft.**—[Influence of Tropical Medicine on Medical Science.] *Ibid.* pp. 14-31.

These articles, written in celebration of the 25th year of publication of the journal in which they appear are, as the title of the first would imply, glorifications of German achievements in this direction, which all will admit have been great, but in an outline of the history of malaria research the name of LAVERAN does not appear and there are other, if less striking omissions. Ziemann is the more disposed to give honour where it is due, but in his account of the transmission of *T. lewisi* by the rat flea we miss the names of MINCHIN and J. D. THOMSON and in that of Romanowski staining methods the name of LEISHMAN. His paper contains much well-digested information.

A. G. B.

MACKEY (G.). **Note on the Variation in Results obtained with Bacteriological Sugars.**—*Indian Jl. Med. Res.* (Special Indian Science Congress Number, 1920.) pp. 55-57.

References have been addressed to the Kasauli Institute regarding the purity of the sugars at present in use, references implying error in the identification of specific micro-organisms. Whether the sugars or the peptones formerly obtained from German sources were purer or more sensitive than those now supplied the author cannot say; but he has found that the vigour of fermentation and gas-formation are "very closely related to the particular medium on which the seed is grown before sowing the sugar media." It is advisable, therefore, "when determining the sugar reactions of an organism to sow the sugars from a fluid broth culture and not from a slope agar culture. And it is very necessary to be precise as to conditions of culture before incriminating the strain or the sugar used as at fault when the results do not come up to expectation."

A. A.

GRABHAM (George Walter). **Some Factors in Thermal Sanitation in the Tropics.**—*Jl. of Hyg.* 1921. Jan. Vol. 19. No. 3. pp. 245-276. With 3 charts, 3 figs. and 1 plate.

This paper deals with the heat-absorbing properties in Upper Egypt of various coloured materials and fabrics, and to a less extent with experiments on the translucency and porosity of materials used for clothing.

The author, who had been accustomed to wearing white shirts, found a khaki shirt much hotter in the sun and a preliminary experiment showed that khaki cloth attains a higher temperature in the sun than cloth of a white colour. He therefore experimented with 14 samples of cloth: black, dark blue, khaki, pale blue and white, and of various textures. The method of test is fully described. These cloths were found to absorb solar heat in the order mentioned above, an unwashed white drill being the coolest. Under given conditions black cloth attained an average temperature of 85° , white drill of 57° C. Paints were then tested in a similar way, applied on cylindrical test flasks with a thermometer inside. Here the absorption ranged from high in the case of black, through green, brown, khaki, cement, red, cream, white enamel to white-wash; the range was from 62.9° to 45.3° C.

The sum of the experiments showed khaki paint to be 22.5° F. hotter than whitewash. A polished metal surface gave a temperature approximating to that of red paint. "A practical test was made by whitewashing the half of the galvanized corrugated iron roof of a barge, the other half remaining in the usual condition," with the dull appearance of weathered metal. "In the sunshine of the middle hours of the day the difference between the temperatures of the two halves was very striking." Some building bricks also were tested. Burnt brick attained a temperature of 53° , while mud or burnt brick whitewashed reached 46° only. In a further series sets of cloth and sets of paint were exposed at the same time. Here the black and khaki cloth attained a higher temperature than the black painted tin. The porosity of cloths was tested by a special apparatus. The figures obtained showed that old calico is twice as porous as new, which again is double as porous as khaki solaro and white drill. In tests for evaporation the rates were almost the same with calico and khaki drill; the texture makes little difference. The translucency of cloths was tested by exposing sheets of ordinary photographic P.O.P. in full sunlight behind strips of different kinds of cloth. The results are depicted in a plate. They seem to show that the proportion of ultra-violet rays that penetrates is negligible. The writer has found by experience that white calico, which was the most translucent of the cloths tested, is an efficient protection to his skin.

"There are many facts that suggest that the harmfulness of the ultra-violet rays of sunlight in the tropics has been much over-rated, and among them may be noted the conditions prevailing in Alpine resorts where, possibly owing to the altitude (Langley), but perhaps mainly due to the efficiency of snow in reflecting rays of the shorter wave lengths, there are exhibited ordinary effects of ultra-violet light such as extreme sun-burning and conjunctivitis of the eyes, yet it appears that no case of "sunstroke" has been recorded from these cold regions. Other illustrations can be drawn from elevated districts within the tropics such as the plateaux of Abyssinia, the higher parts of East Africa and South America, where, so long as the temperature is cool, life seems to be pursued with little attention to the violet and ultra-violet rays, which must be at least as powerful as in the hotter, low-lying parts, where protection against them has been so strongly upheld."

The author notes that there is a peculiarity connected with sunburning that remains to be explained: though a thin covering is enough for protection, the sun's rays need not act directly, for the face becomes burnt up to the point where the hat touches the forehead though the face itself may be completely in shadow.

To obtain evidence on the effect of wearing a white shirt under a khaki coat, the influence of white layers under khaki was tested. It was found that the intervening white layer made practically no difference to the temperature.

The general effect of the paper is to show the coolness of white as compared with other colours. As to translucency, even fairly thin white cloth appears to afford all the protection necessary to preserve tender skins from ordinary physiological effects of the shorter wave lengths of solar light. Another advantage in white clothes is that they attract neither tsetse flies nor mosquitoes.

A. G. B.

HUNTINGTON (Ellsworth). **The Relation of Health to Racial Capacity : the Example of Mexico.**—Reprinted from the *Geographical Review*. 1921. Apr. Vol. 11. No. 2. pp. 243-264. With 10 text-figs.

Ellsworth Huntington is the author of "Civilization and Climate," recently reviewed at some length in this *Bulletin* [Vol. 17, p. 345]. In the present paper his object is to show how in Mexico health plays a part in determining racial character, but incidentally his discussion and the statistics given are of interest to *Bulletin* readers. He gives a tabular comparison of death-rates in various cities of the world for the period, in most instances, of 1901-13. This is headed by Amsterdam and London with 12·6 and 14·7 per mille respectively, and concluded with Cairo and Lucknow, just above which come Vera Cruz and Mexico City with 41·2 and 45·7. Taking the death-rate as the best measure of the health and vigour of a community, he assumes a very high degree of ill-health in Mexico. Mexico City, lying at an elevation of 7,500 feet, and being free from malaria, should be a healthy place, as should the municipalities which surround it, but in these also the death-rate varies from 30 to 52. The author believes that the great cause of most of the poor health of Mexico is the climate. He classes the tropical cities of his table thus :—

"(1) *Low, moist and hot* : Calcutta, Panama, Bombay, Madras, and Vera Cruz. Average death-rate 34·6.

"(2) *High, dry and cool* : Johannesburg and Mexico City. Average death-rate 37·6.

"(3) *Low, dry and hot* : Cairo and Lucknow. Average death-rate 53·8.

"Of course the number of cities in these three groups is by no means enough to lead to positive conclusions. Many other facts, however, point so clearly in the same direction that we may regard the groups as typical. They lead to the following conclusions :—

"(1) Tropical highlands have by no means the advantage in health that is usually supposed.

"(2) Dry tropical regions are in general worse than those that are moderately moist, provided we consider only those places from which such scourges as malaria and yellow fever have been eliminated.

"(3) Among the well populated parts of the tropics undue dryness on the one hand and monotony on the other do almost as much harm as high temperature. This does not mean that extreme humidity is good, but the point that we are here making is that, in spite of the popular impression to the contrary, dry heat is not so good as that with a reasonable amount of moisture."

Mexico is not alone in its indications as to the harmfulness of dry air. In India, as appears from a ten-year seasonal curve, the dry winter

season, in spite of its more favourable temperature, is much less healthful than the wet season in summer. Extreme humidity at high temperatures, however, is equally adverse, as the seasonal varieties at Vera Cruz show. Another table exhibits the variations in temperature of some of the chief places in Mexico. In Mexico City the difference between the mean temperature of the coldest and that of the hottest month is only 13° F., "only from a third to a fifth as great as in the north-eastern United States." Such variations are considered by Huntington as one of the greatest aids to health.

A series of charts shows in a graphic manner the distribution of malaria, dysentery, respiratory diseases, tuberculosis, smallpox and typhus in Mexico.

A. G. B.

BOUCHER. **Sur un bacille septique aérobie.**—*Bull. Soc. Path. Exot.* 1921. Jan. 12. Vol. 14. No. 1. pp. 31-38.

This bacillus was isolated from five cases of meningitis at Tananarive, Madagascar, in one of which it appeared to be the causal agent. Inoculated into animals it produces gangrenous lesions. It is seldom found in pure culture, probably owing to the fact that it is usually a secondary invader. The bacillus is spore-bearing, stains by Gram, and is non-motile; it grows very rapidly. The author compares it with other described bacilli, and concludes that it is a new species, which he designates *Bacillus septicus meningitidis*.

A. G. B.

CARDAMATIS (Jean P.). **Les Mégalosplénies de cause inconnue. Mégalosplénies infectieuses.**—*Bull. Soc. Path. Exot.* 1921. Mar. 9. Vol. 14. No. 3. pp. 168-179. With 1 text-fig.

An abstract and discussion of two fatal cases of "infectious idiopathic splenomegaly," occurring one after the other in two children, aged respectively 8 and 5 years, of the same family in Greece, the examination of blood and spleen-pulp both by microscope and by culture being negative. The first symptom of all was intense anaemia; then followed wasting and gradual enlargement of the spleen; there was tumefaction of the liver, but no sign of jaundice either of skin or of conjunctiva, and no ascites; throughout the course of the disease there was fever of an interrupted and remittent type. As in Banti's disease the percentage of neutrophile polymorphs was much reduced, and there was no appearance of myelocytes. There was slight evidence of rickets and the author thinks that rickets and malaria may possibly have been predisposing causes. The parents were young and perfectly healthy and free from all suspicion of tubercle, syphilis and alcoholism. The author carefully differentiates these cases from Banti's disease and from other forms of splenic leucaemia, and thinks that they must be classed as splenomegaly of an unknown nature, but attributable to some virus.

A. A.

CHABUKSWAR (Y. V.). **A Barbaric Method of Circumcision amongst some of the Arab Tribes of Yemen.**—*Indian Med. Gaz.* 1921. Feb. Vol. 56. No. 2. pp. 48-49. With 2 text-figs.

One gathers that the formidable operation here described is peculiar to one district called Al Hoora, which includes six villages. The

operation takes place on men who intend to marry ; it is performed with many rites, *coram populo* ; no anaesthetic is allowed, and it is abandoned if the victim winces. In the horrible "operation," the knife is inserted about an inch below the umbilicus, and all the skin of the pubis and penis is flayed off, a portion of the urethra sometimes coming with it. Hernia and urethral fistula are common results. The wound takes months to heal and deaths from sepsis are common.

The author's photographs of cases that subsequently came under the Civil Surgeon of Aden for relief of hernia and fistula due to the operation are evidence that men do submit to this extraordinary kind of circumcision, and are alive to testify to it. Truly, as Carlyle says, there is no such strange animal as man.

A. A.

CARTRON & BACQUÉ. **Notes sur la vaccination antipneumococcique et la sérothérapie antipneumococcique chez les tirailleurs sénégalais à Biskra (Algérie), 1919-1920.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1920. Dec. Vol. 18. pp. 46-61.

The Senegal Rifles [strength not stated] stationed at Biskra seem to have had a bad time. From May-October, 1919, there were 239 hospital admissions for jaundice and 245 for guinea-worm, and from May, 1918, to May, 1920, 203 deaths from tubercle.

As regards pneumonia and pulmonary congestion the admissions were : from May, 1918, to May, 1919, 646 hospital admissions ; from May to November, 1919, 56 ; and from November, 1919, to May, 1920, 19.

Antipneumococcic vaccination has not given any conclusive results ; but antipneumococcic serum has distinctly mitigated the course of individual cases of pneumonia. The first injection (40 cc.) should be given at the commencement of the attack, and the injection should be repeated daily for at least three days.

A. A.

CAMPOS (J. J.). **Chronic Lead Poisoning in the Printing Presses of Calcutta.**—*Indian Med. Gaz.* 1921. May. Vol. 56. No. 5. pp. 175-178.

The author has examined six employés from each of three printing presses in Calcutta, and has detected several cases of colic, pains in hands and feet, blue line, and changes in the blood, besides other symptoms less characteristic of lead poisoning. He points out that the statistical data are vitiated by the fact that printers with neuritis give up their work and are no more seen. Lead is absorbed through the lungs from the dust, containing lead and antimony, which is raised by dry sweeping ; through the skin or erosions produced by using lye to clean the type ; by the gastro-intestinal tract when betel is chewed and food is eaten in the presses ; and by the habit of printers of holding type in their mouths. He says that industrial medicine is almost neglected in India [a reproach which the Editor of the *Indian Medical Gazette* assures us is about to be taken away].

A. G. B.

SIPERSTEIN (David M.) & LITMAN (Morris). **Studies on the Effects of Quinine on the Liver, Blood Cells and Urine of Rabbits.**—*Arch. Intern. Med.* 1921. Apr. Vol. 27. No. 4. pp. 449-456. With 7 figs.

In the course of a series of observations on the excretion of bile pigments after the administration of quinine, J. P. SCHNEIDER found that the bile pigments of the duodenal contents were largely increased and that urobilinogen also appeared. This was considered to be an indication of pathologic changes in the liver. Hence the present investigation, in which doses of quinine comparable with those given in clinical practice were administered intravenously to 11 rabbits, 2 being kept as controls. The result was progressive degenerative changes in the liver cells, well shown in the micrographs, increasing with the dosage. There was also, in four rabbits further studied, a moderate transitory polycythemia suggesting a loss of plasma, rendered persistent by repeated dosage, and polyuria. [CORNWALL, who studied the effect of prolonged dosage with quinine on rabbits, found changes in the adrenals and kidneys; the liver is not mentioned (see this *Bulletin*, Vol. 15, p. 266).]

A. G. B.

FISHER (Walter). **The Action of Quinine on Pregnant and Non-Pregnant Uterus in the Tropics.**—*Brit. Med. J.* 1921. June 18. pp. 891-892.

In the tropics some practitioners advise pregnant women to abstain from quinine; but in 32 years' experience of Central Africa, the author has never known any harm to result from a prophylactic dose of $2\frac{1}{2}$ grains, morning and evening, during pregnancy. He has never known quinine to cause abortion.

Undoubtedly the effect of quinine on the resting uterus is to cause a sort of menorrhagia, but the author thinks that this, too, may be obviated by dividing the prophylactic dose equally between morning and evening.

A. A.

SOLLMANN (Torald). **The Quinotoxin Myth.**—*Jl. Amer. Med. Assoc.* 1921. Apr. 9. Vol. 76. No. 15. pp. 999-1001.

Some writers, the author states, have attributed the toxic effects of quinine to the formation of a more toxic substance "quinotoxin," or quinicin as it is more properly called. This may be formed from quinine in the presence of free organic acids, and it has been assumed that such a condition would arise in the stomach.

The author finds that there is no occasion to fear toxic effects from such a transformation. "Quinotoxin" is not specially toxic and could not be formed in significant quantities, if at all, in the body. It may develop slowly in prescriptions containing quinine and organic acid, but would be transformed into inactive products. For this reason such solutions should not be used.

The paper contains technical chemical information about quinicine.

A. G. B.

STEPHENS (J. W. W.), YORKE (W.), BLACKLOCK (B.), MACFIE (J. W. S.), COOPER (C. Forster) & CARTER (H. F.). **Have Differential Leucocyte Counts any Value?**—*Ann. Trop. Med. & Parasit.* 1921. Feb. 8. Vol. 14. No. 3. pp. 371-388. With 5 text-figs.

The question raised in the title has been asked before, but, as a rule, on the ground of the interpretation of the several varieties of leucocyte. Here there was no attempt to do more than class them as mononuclear and polymorphonuclear respectively. A differential leucocyte count, the authors remark, can only be of value if (1) the portion of film counted is of the same composition as the rest of the film, or as corresponding portions of the film; (2) the blood issuing from the puncture has the same composition as that in the vessels; (3) the "normal values" of the text-books are correct.

With regard to the distribution of leucocytes on a film, ROGERS states that an excess of polynuclears will be found along the edges and in the distal tags and of lymphocytes in the centre, and recommends transverse counts; DANIELS and NEWHAM, on the other hand, advise counts of central areas.

The authors examined the whole of two small films, ruling them into areas classed as central, transverse, edge, and tongue areas (some of which overlap), and determined the mononuclear percentage for each. It proved to be highest in the central areas and lowest in the tongue areas (45 and 25 in one example), the edge areas giving an intermediate figure (29). The mononuclear percentage found in the edge areas approximates most closely to that in the total film.

They then examined different areas of ordinary large films, the same observer counting 250 leucocytes in different areas of the same film in one series, and 1,000 in another. The results showed irregular distribution of the mononuclears, and it is concluded that it is desirable to confine the counts to edge areas. This experiment and the one that followed showed the inconstancy of the results obtained by counts of 250. In the latter all the six observers made counts and the discrepancies are shown in the tables, the greatest range in the case of the edge areas being 13. This difference might be attributed to the various observers examining different parts of the edge or to different interpretation, and in order to elucidate the problem minute films were made and all the leucocytes present examined by the different observers. Sixteen films were thus examined and in no instance did more than two observers agree. The discrepancies might be due to defective action of the mechanical stage, the tongue-like prolongation of the film making counting here difficult, or damage to the leucocytes, so that a cell considered unrecognizable by one is counted by another. The maximum variation from the actual mononuclear percentage was, however, only four, so that the errors arising from differences of interpretation are small, and the errors of the other experiments are due to different observers examining different leucocytes.

In another experiment successive drops of blood were used, flowing freely from the same puncture, and 500 cells in edge areas were counted by each observer; the result was checked by larger counts. It was found that the result obtained might be as much as eight above or eight below the "true" figure obtained by 8,000 counts, so that differences of 16 in edge counts of 500 do not necessarily mean that

the mononuclear percentage in the various bloods concerned is actually different.

"These preliminary experiments, which deal solely with attempts to determine the mononuclear percentage of the blood of normal persons, suffice, we think, to show that considerable difficulties surround what has hitherto been regarded as a simple matter."

A. G. B.

CLARK (Janet Howell). **The Action of Light on the Leucocyte Count.**

—*Amer. Jl. Hyg.* Baltimore. 1921. Jan. Vol. 1. No. 1. pp. 39–62. With 13 charts in text.

After a critical consideration of previous work on the action of light on the blood, the author concludes that exposure to sunlight results in an increase of lymphocytes, but notes that the experiments have all been complicated by the action of heat, and are suggestive rather than decisive. The result of the author's experiments tend in the same direction.

Rabbits enclosed in a box were exposed to the light of an iron arc for one hour at 10 inches, a distance at which there was no heat effect. Only the ears were radiated. The region of far ultra-violet had practically no effect on the absolute number of polymorphonuclears, but produced a very marked lymphocytosis lasting about three weeks; the near ultra-violet had a depressing effect on both classes of cells especially the former; the region between 450 and 650 had a stimulating effect on both, and more particularly the lymphocytes; and the wave length beyond 650 (red and infra-red) had no effect on the blood. It appears that in previous work no attempt was made to study different wave-lengths of light separately.

The interest of these results lies in the fact that experiments have shown that lymphocytosis increases the resistance of mice to tuberculosis and a reduced lymphocyte count lessens that of monkeys to polyomyelitis. ROLLIER has suggested that the beneficial effects of heliotherapy in tuberculosis may be due to the action of the actinic rays in increasing the lymphocyte count.

"If a condition may be obtained in which the absolute number of polymorphonuclears remains practically normal while the absolute number of lymphocytes is greatly increased, as after exposure of rabbits to a bare iron arc, the blood would have normal phagocytic power, together with such increased resistance as may depend upon the peculiar activity of the lymphocytes."

A. G. B.

BHATTACHARJEE (S. R.). **Preliminary Notes on the Use of Tincture**

Iodine Intravenously.—*Indian Med. Gaz.* 1921. Feb. Vol. 56. No. 2. pp. 49–55. With 10 charts.

Brief notes of some interesting cases illustrating the results of intravenous injections of iodine. In two cases of mauling by a leopard the wounds were dressed with H_2O_2 , and 3 minims of tr. iodi. in 2 drams of water were injected by vein, this treatment being continued until the third day, when the iodine was intermitted in one case for comparison: on the fourth day the less severe case, in which the iodine had been stopped, was doing ill, while the other case had a normal temperature and clean healing wounds. A case of cellulitis with a temperature of $103^\circ F.$ was discharged cured after treatment for three days with a daily injection of 8 minims of tr. iodi. Ten cases

of syphilis and one of yaws have been quickly and greatly benefited by a few daily injections of iodine. In a case of quotidian malaria the temperature fell to normal after two injections, and remained so for eleven days.

A. A.

PORTER (J. W.). **A Plea for the More Frequent Use of Intravenous Medication, with Special Reference to the Use of Iodine.**—*Indian Med. Gaz.* 1921. May. Vol. 56. No. 5. pp. 161–162.

The author pleads for the more frequent use of the intravenous method of medication. He points out that the blood possesses greater resistance to infection than any tissue in the body, and that remedies need not be introduced in high dilution as was formerly believed; e.g., 0.9 gm. neosalvarsan can readily be given with a 10 cc. syringe. He goes on to consider the frequency of leucocytosis in disease—nature's method of dealing with invading organisms, and the value of iodine in increasing leucocytosis, quoting from the literature, for it appears he has not had an opportunity of practising its administration himself. In the form of liquor iodi as much as 4 gr. of iodine may be given by the intravenous route.

A. G. B.

CHRISTOPHERSON (J. B.). **Further Notes on the Intravenous Injection of Antimony Tartrate. Leucoderma and Skin Complications; Administration of Large Doses.**—*Lancet.* 1921. Mar. 12. pp. 522–525. With 2 charts and 2 text-figs

The author deals with the treatment of kala azar, oriental sore and bilharziasis by antimony. He gives the chart of a Sudanese boy, aged 18, who in 86 days received $87\frac{1}{2}$ gr. of antimony pot. tartrate for verified kala azar. Two years later he was accepted for Government service. The case shows that a considerable quantity of the drug may be introduced into the veins without ill-effect; 3 gr. may be injected every other day for 16 times in 33 days, the doses having commenced at 1 gr. daily. Of the various incidents attending the administration, the author finds the cough, metallic taste and tightness in the chest alone to be frequent. Cough, retching, colic, indicate a need for caution; jaundice and more albumin in the urine than can be accounted for by the disease—danger. A common complication is pains in the shoulder and "lumbago" 4–6 hours after injection, when a total of about 10 gr. has been given. They indicate interference by the antimony with the normal metabolism of the liver and usually pass off. After a total dose of 30 gr. the Arab boy became piebald, a rare complication, which is exhibited in a photograph; a "lichen planus" condition of the skin preceded. These phenomena indicate that the skin is concerned in the elimination of the antimony.

In bilharzia disease less antimony is needed—20–30 gr. suffice; and in oriental sore 5–8 gr. may effect a cure. For none of these diseases is there a fixed curative dose. The author contrasts the amounts of antimony which may be given by the veins and mouth respectively, and draws the conclusion that the blood is capable of standing a large amount of rough treatment. The blood is the logical

route for direct attack upon micro-organic and other diseases. He surmises that the drug penetrates the envelope of the Leishman-Donovan body, just as it does that of the miracidium. In the case of kala azar described the spleen and liver did not go down under antimony alone; 10 gr. of quinine were therefore given daily for 47 days, after which the enlargement disappeared.

A. G. B.

ALLMAND (Dorothy). **Liverpool School of Tropical Medicine. Scientific Record.**—*Ann. Trop. Med. & Parasit.* 1921. Apr. 27. Vol. 15. No. 1. pp. 1–47. With 9 plates.

The opening of the new laboratories of the Liverpool School of Tropical Medicine is the occasion of this survey, which covers the period from the founding of the school in 1898 to July, 1920. After an introductory section, in which the new laboratories are described and an outline of the school's history is sketched, the scientific activities are recounted under the headings, Malaria and Sanitation, Blackwater Fever, Piroplasmosis, Trypanosomiasis, Yellow Fever, Relapsing Fever and Spirochaetes, Amoebiasis, Beriberi, Helminthiasis, Filariasis, Entomology, Protozoology. Truly a remarkable record of activity, which reflects the greatest credit on the school and its staff.

A. G. B.

GUÉRIN. **L'Assistance médicale dans l'Inde française et l'École de Médecine de Pondichéry.**—*Bull. Soc. Path. Exot.* 1921. Mar. 9. Vol. 14. No. 3. pp. 134–141.

French India consists of the settlements of Pondicherry and Karikal on the Coromandel coast, Chandernagore above Calcutta, and Mahé on the Malabar coast. These have hospitals with a total of 250 beds and a number of dispensaries. There are 20 native health officers, 8 midwives, and 12 travelling vaccinators. Despite difficulties raised by the natives six thousand children are vaccinated yearly. The vaccinators discover the first cases of cholera, for the treatment of which the natives are ready to accept European methods. There is also a leprosy, which cares for 120 lepers. The personnel for all these forms of medical relief is trained at the Native School of Medicine at Pondicherry, which came into existence in 1823. The history of the school is given; it contains pupils who are to become health officers, vaccinators and midwives. All must be able to read and write French. The course for the health officers is five years. The vaccinators have a two years' training, after which they are examined in minor surgery and practice of vaccination and the diagnosis and treatment of epidemic diseases, especially those most frequently observed in the colony. The training of the midwives lasts three years.

There are three French instructors, one of whom is the director, and two native instructors. In the last ten years there have been 70 students, of whom 40 have obtained diplomas and five are continuing their studies in France. Twenty vaccinators and 17 midwives have qualified. The diplomas are accepted for practice in British India.

A. G. B.

FONTOYNONT. **L'École de Médecine indigène de Tananarive.**—*Presse Méd.* 1921. Feb. 26. No. 17. pp. 294-297.

This is an address given by the Dean of the Native Medical School at Tananarive, Madagascar, on its 25th anniversary.

The school was founded by General GALLIENI in 1896, the year following the occupation of the capital by the French, and it formed the model for the later schools in Indo-China and West Africa. It has granted 336 medical diplomas, but 56 of these were to old practitioners in order to regularize their position; it is now regretted that the old doctors received the same diploma as the new, as these suffered in public esteem. After an examination the young Malagasy enters a school which is preparatory for the School of Medicine; a year later a second examination admits to a year of probation at the Medical School, after which the student enters on the four years' course of studies.

In 1899 a native medical staff was organized, and in this all the doctors trained in the school have to serve for a period; the numbers are at present insufficient to supply the whole country, but quality has been considered rather than quantity.

The school trains midwives also, and of these 208 have been turned out. In the great influenza outbreak in 1919, 15 of the native doctors lost their lives. In the war 18 were mobilized and did excellent service.

A. G. B.

PORAK (René). **L'École de Médecine de Téhéran.**—*Presse Méd.* 1921. Aug. 13. No. 65. pp. 1173-1175.

The author was appointed by the Persian Government to teach clinical medicine at Teheran. When he reached Persia he found nothing but a lecture hall. He remarks that at the Teheran School of Medicine anatomy is taught without dissection, physiology without experiment, and pathology without the examination of the sick. The Germans built a fine hospital; this was taken over by the English and the French have no access to it, a condition to which the Persian professors have accommodated themselves. He notes also that though there are primary schools in Persia where French is taught no secondary school exists, so that there is no basis of instruction to build on. After eight months' effort he was promised a hospital by the Persian Government and he has returned to France to gain aid for his schemes.

A. G. B.

SERGEANT (Edmond). **Rapport sur le fonctionnement de l'Institut Pasteur d'Algérie en 1920.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Mar. Vol. 1. No. 1. pp. 127-139.

Of the 5,617 analyses, chiefly microbiological, 221 were veterinary; 2,518 persons received anti-rabies treatment.

The meteorological conditions of the winter and spring fortunately mitigated the malaria, for the high cost of labour made it necessary to suspend prophylactic measures in three villages. Three thousand persons received quinine regularly, the drug being distributed by 22 agents. An account of the campaigns in progress is given.

The units or doses of vaccines and serums reached 2,840,000, the majority of which were anti-smallpox and anti-sheep-pox vaccines.

A. G. B.

MEDICAL JOURNAL OF AUSTRALIA. 1921. Mar. 12. Vol. 1. 8th Year. No. 11. pp. 218-219.—**The Walter and Eliza Hall Institute of Research in Pathology and Medicine. Annual Report for 1920.**

The Institute, the first year's working of which is here described, has devoted special attention to two main researches: the various problems of hydatid infestation of man and an investigation into the incidence and etiology of acute respiratory affections.

Dr. Hamilton FAIRLEY has studied the value of the complement fixation reaction in echinococcal infections. A series of 481 cases from Victoria, South Australia and New South Wales was investigated; 53 of these suffered from hydatid disease and 47 (89 per cent.) gave positive serological reactions. No patient unaffected by hydatid was positive. Observations indicate that, unless a second cyst be present, the reaction disappears within three months of a successful operation. If this is confirmed, the surgeon has a valuable test of cure. The value of antimony in treatment has been tried on a few hospital patients, with disappointing results. The drug apparently fails to reach the incapsuled parasite. The work is being continued.

FAIRLEY and DEW have commenced a series of studies on malaria, the dysenteries, and the pathology of human bilharziasis, for the purpose of which 150 blocks of tissue were brought from Egypt. Other researches are briefly described.

A. G. B.

UGANDA PROTECTORATE. **Annual Report of the Bacteriological Department for the Year ended 31st December, 1920.** [DUKE (H. Lyndhurst), Bacteriologist, Uganda Protectorate.]—20 pp. with 1 folding plan. 1921. Entebbe: Printed by the Government Printer. [Price not stated.]

After reference to the allocation of duties among the small staff and to the experimental animals available, the author describes briefly malaria among the laboratory monkeys; the appearance of the parasites suggested those described by KNOWLES [this *Bulletin*, Vol. 15, p. 261]. Malaria with rigors and rise of temperature occurred in a captive chimpanzee, but the parasitology could not be properly followed up.

In Part II is a description of the examinations performed. Of 695 *Glossina palpalis* dissected on Damba island one had trypanosomes in the salivary glands. In feeding experiments one of four monkeys, on which 3,029 flies caught on the lake shore near Entebbe fed, developed the lake-shore trypanosome. Infection occurred three times with wild Damba flies, 440, 1,054 and 310 having fed. A worm and a fungus found in *G. palpalis* are briefly described.

Agglutinating rabbit sera have been prepared against various organisms, according to the procedure of CHICK and DALYELL. High titre sera were invariably obtained and kept their potency amid unfavourable circumstances. The Flexner type of dysentery bacillus was recovered from native stools on several occasions, but not Shiga nor *E. histolytica*. DUKE writes—"Of epidemic diseases, other than venereal, plague and smallpox are the principal enemies of the Uganda native." There is at present no evidence that enteric fever occurs in undisturbed native communities.

Part III deals with Arneth and differential counts, the results of which are expressed in tables occupying several pages. In making blood counts Duke notes that he neglected the ends of the smear and he defines what he means by large mononuclears. The average Arneth index for 11 Europeans, 13 Indians and 9 Baganda, all apparently healthy, was 62.1, 65.6 and 59 respectively; malaria caused a shift to the left in Europeans and Asiatics, but not necessarily in Baganda. A persistent shift to the left is a usual sign that the subject's health is impaired. Typhoid fever in the native caused a shift to the left. Some inconclusive experiments were made on the effect of administration of cocaine or quinine on the numbers of the large mononuclears.

Part IV, dealing with the preparation of vaccine against smallpox, will be treated elsewhere.

A. G. B.

FLU (P. C.). [In Dutch and English.] **Verslag over de werkzaamheden aan het Geneeskundig Laboratorium te Weltevreden gedurende het jaar 1919. Report on the Work done at the Geneeskundig Laboratorium at Weltevreden in 1919.**—*Meded. Geneesk. Lab. Weltevreden.* 1920. 3rd Series A. Nos. 10, 11 and 12. pp. 398-473.

The routine work carried on at the laboratories included diagnostic tests of all sorts, serological, bacteriological, microscopical, etc., water examination, and chemical and histological examinations, and autopsies.

Four fatal cases of acute intestinal trouble, diagnosed variously as peritonitis and suspected cholera, baffled investigation and were finally, by exclusion, conjectured to be due to malaria.

A great deal of experimental work seems to have been done, the investigations including plague immunization, ankylostoma and other helminth problems, filtration of water, the biological processes of the septic tank, the radio-activity of therapeutic springs, and the value and the vitamine-content of various foodstuffs. The following conclusions of the last-named subject of inquiry are of interest :—

Boiled potatoes, though insufficient in anti-beriberi vitamins, are richer than washed, polished rice. Tapioca flour is very poor in vitamins, much poorer than dried cassava-root and sago. Monkey-nuts and soya beans and other local legumes are rich in vitamins, as also is canary-seed. Maize is rich in vitamins, but they are often lost in the preparation of maize flour. Australian milk-powder packed in tins contained a high percentage of fat-soluble vitamins, but not when packed in cardboard. The natives of large towns of Netherlands India eat chiefly polished rice, and though they may not actually suffer from beriberi, it is probable that the resulting deficiency of vitamins plays a considerable part in the high mortality of these towns.

The question of tuberculosis was taken up, for, contrary to the general opinion held up till recently, it now appears that tuberculosis is responsible for many deaths among all classes and races of the population. Infection from cattle cannot be common in Java, since the natives do not use cow's milk much, and tubercle has seldom been observed in buffaloes, which are the bovines with which the native comes most in contact.

A. A.

JAVA. Jaarverslag van het Centraal Militair Geneeskundig Laboratorium over het Jaar, 1919. [Central Military Medical Laboratory Report for 1919.] [BRUG (S. L.), Director.]—51 pp. 1920. Batavia: Javasche Boekhandel & Drukkerij.

After a description of the laboratory staff and the facilities at its disposal, the report gives a detailed account of the work done in the department of clinical tropical pathology.

Among other work of interest, the relations of "tropica" to tertian infection was found to be the same in 1918 as in the preceding year, 60 : 40.

In scientific research an attempt was made to adapt BAERMANN'S method for determining hookworm larvae in soil to the examination of faeces [see this *Bulletin*, Vol. 12, p. 181].

An investigation as to the use of rice-bran pills in the treatment of beriberi proved that, with ordinary diet, 10 "Dedek" pills three times a day, representing the alcoholic extract of about 70 gm. of rice-bran from 1 kg. of unpolished rice, together with katjang idjoe (*Phascolus radiatus*) twice daily, were very efficacious in the treatment of beriberi, and also promised to be useful as a prophylactic when unpolished rice was unobtainable.

Further experiments were made to determine whether *Culex fatigans* was a possible carrier of *Filaria bancrofti*. It was found to be quite competent as such when well fed. The rarity of filariasis in Batavia is therefore not due to the absence of a competent carrier, and is still unexplained.

S. L. BRUG, in his researches on intestinal parasites in persons without intestinal symptoms, prefers repeated examinations (three at least) to concentration methods, except to diagnose slight worm infections. The diagnosis of slight worm infections is less important than protozoal ones, because worms multiply outside, protozoa inside, the body. He concludes that about 25 per cent. of the soldiers examined are *Entamoeba histolytica* carriers [but see this *Bulletin*, Vol. 18, pp. 34–35]. Several tables illustrate his findings, the one (No. III) comparing the findings of DOBELL, MATTHEWS and MALINS SMITH, and BRJLSMA after repeated examinations for *histolytica* being particularly interesting.

J. Campbell Graham.

BOUFFARD (G.). De la rage canine en Afrique Occidentale Française. —*Bull. Soc. Path. Exot.* 1921. Jan. 12. Vol. 14. No. 1. pp. 6–9.

Mad dogs have been known for a long time in French West Africa. These dogs have from time to time bitten man, but man himself has never contracted rabies. No case can be found in the records, nor do the chiefs know of any. That the affection in dogs in the Sudan is really rabies was proved by CAZALBOU, as well as by the author. HECKENROTH, who studied rabies in Senegal and saw several cases in man, suggested that there existed two strains, one indigenous, harmless to man, the other of recent introduction and transmissible to him [see this *Bulletin*, Vol. 13, p. 34].

The author, in 1917, in Dahomey, inoculated the medulla of a dog dead apparently of dumb rabies into rabbits and guinea-pigs, which died with typical symptoms, and kept up the strain for 28 passages.

No animal was resistant. Later he had a similar experience with another dog, leading him to the conclusion that though human rabies is unknown, canine rabies exists. He is not convinced of the truth of HECKENROTH's hypothesis, and hopes to compare the indigenous with the European virus in France.

A. G. B.

REMLINGER (P.). **La durée du traitement antirabique peut-elle être écourtée? Un procédé rapide.**—*Arch. Instituts Pasteur de l'Afrique du Nord*. 1921. Mar. Vol. 1. No. 1. pp. 45-48.

The argument of this paper is that in the present hard and impoverished times the old protracted method of antirabic treatment might well be shortened; institutions cannot afford it, and patients have no time to spare for it.

It is suggested, therefore, that all patients should be treated somewhat in the rapid manner now followed in grave cases, namely by four injections of desiccated cords daily for five successive days, according to the following formula:—1st day, morning 7-7, afternoon 6-6; 2nd day 5-5, 4-4; 3rd day 4-4, 3-3; 4th day 5-5, 4-4; 5th day 4-4, 3-3. In grave cases three series of injections would be given daily:—1st day, morning 7-7, afternoon 6-6, evening 5-5; 2nd day 5-5, 4-4, 3-3; 3rd day 5-5, 4-4, 3-2; 4th day 4-4, 3-3, 3-2; 5th day 4-4, 3-3, 2-2. In the gravest cases, e.g., bites in the face or wolf bite, the last series of injections would be continued for some days more. To mollify this rapid treatment the injections would be spread well over the abdomen and outer surface of the thighs and the punctures dressed with cold compresses. Some old people and sufferers from organic disease would have to be treated less rapidly.

A. A.

PONDMAN (A.). **Over het immuniseerend vermogen van afgestorven virus fixe.** [On the Immunizing Power of Dead Fixed Virus.]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1921. Vol. 61. No. 1. pp. 8-40.

Pondman found at the Pasteur Institute of Weltevreden (Java) that a fixed virus emulsion had died after six months when kept at 8° C., but still had strong immunizing power. After another three months this property had decreased slightly.

Another series of experiments showed that a fixed virus emulsion (1 : 25), with $\frac{1}{2}$ per cent. carbol, died when kept in the incubator at 37° C. for ten days and afterwards at room temperature in the dark for five days. The immunizing power of this emulsion was well preserved.

To reduce the quantity to be injected the author tried an emulsion of 1 : 10 prepared in the same way. This had to be kept after incubation at 37° C. for ten days at room temperature in the dark to lose its virulence. Pondman could immunize rabbits completely with this emulsion after storing it for $4\frac{1}{2}$ months in the dark; the rabbits were saved by treatment in this way after intracerebral injection of street virus.

This is a severe test of the endurance of the vaccine, and the author thinks that it will be possible in future to commence the antirabic treatment at virus depots on the other islands of the Dutch Indian Archipelago if there should be any delay in sending the patients to the Pasteur Institute at Weltevreden.

W. J. Bais.

STIMSON (A. M.). **Biologic Therapy. XII. Rabies Vaccine.**—*Jl. Amer. Med. Assoc.* 1921. Jan. 22. Vol. 76. No. 4. pp. 241-242.

Dr. A. M. Stimson, dealing with the principles and practice of antirabic inoculation, remarks that in the Hygiene Laboratory of the U.S. Public Health Service the use of long-dried material, presumably inert, is now discontinued; also, while admitting the difficulty of accurately appraising the protection afforded by the Pasteur treatment owing to the general imperfection and insufficiency of the data, he remarks that the general trend of the evidence clearly reveals a specific immunizing effect.

A. A.

ABBATUCCI. **La toxémie dans le typhus exanthématique et sa symptomatologie.**—*Bull. Soc. Path. Exot.* 1921. Apr. 13. Vol. 14. No. 4. pp. 202-205. With 1 chart in text.

A case of typhus at Beyrout in which, after the initial fever, there was a complete remission lasting three days, and the eruption did not appear till the twelfth day. The post-mortem findings recall to author those he has reported after death from arsenical poisoning.

A. G. B.

BÉGUET. **Étude de quelques bactéries utilisées pour le sérodiagnostic du typhus exanthématique.**—*Arch. Instituts Pasteur de l'Afrique du Nord.* 1921. Mar. Vol. 1. No. 1. pp. 49-55.

——. **Note sur quelques bactéries utilisées pour le sérodiagnostic du typhus exanthématique.**—*Bull. Soc. Path. Exot.* 1921. Mar. 9. Vol. 14. No. 3. pp. 142-143.

Of four stocks of germs issued to the author as *Proteus* X-19 for serum diagnosis of typhus, and giving a positive Weil-Felix reaction in typhus cases and negative results in other cases, three, coming respectively from Paris, Metz and Syria, were of the *Proteus* group, and one, coming from Constantinople and showing the highest agglutination of all, is not a *Proteus*, but is an immobile *Coccobacillus* of a new type and is designated *Coccobacillus byzantinus* by the author.

A. A.

STEVENSON (A. C.) & BALFOUR (Andrew). **Notes on the Histo-Pathology of Typhus Fever.**—*Jl. Path. & Bact.* 1921. July. Vol. 24. No. 3. pp. 289-305. With 3 plates.

The authors have studied the tissues from five fatal cases of typhus fever occurring in the Caucasus. They give a resumé of the more important recent work on the histo-pathological changes and on the occurrence of *Rickettsia* in the tissues. It is now recognized that typhus is really a systemic disease of the smaller arteries and capillaries, and the vessels of the brain and upper part of the spinal

cord are specially liable to be affected. They discuss the changes found in each type of tissue in their cases, illustrating them in three plates of figures. They found granules which were possibly Rickettsia in the nerve cells of the cerebrum as well as in lung, spleen and liver, but "so many different species of Rickettsia have been found that . . . we confess to having doubt as to their exact nature, let alone their pathological significance." A list of 40 references is appended.

A. G. B.

LINTZ (Joseph). **Elephantiasis with Reference to Syphilis.**—*New York Med. Jl.* 1921. Apr. 6. Vol. 113. No. 11. pp. 535-538.

Three cases of what, it is considered, could definitely be called elephantiasis are here abstracted. There was a history and evidence of syphilis, and improvement under anti-syphilitic treatment was slow but marked. Two of the cases were examined for microfilariæ, with a negative result.

The author, who is not satisfied with the filaria theory of elephantiasis, suggests that all cases of the disease should be examined for evidence of syphilis and intensive antisymphilitic treatment tried.

A. A.

PORTER (J. W.). **The Use of Clamps in restraining Haemorrhage during the Operation for Elephantiasis of the Scrotum.**—*Indian Med. Gaz.* 1921. Feb. Vol. 56. No. 2. pp. 41-42.

Three or four days before the operation an intravenous injection of "0.9 novarsenobenzol" is given, which appears to soften and relax the skin of the scrotum almost immediately. The author thinks this extremely rapid result must be due to the instant death of some of the parent worms and the consequent restoration of the lymph circulation. For the next few days the softening of the skin is aided by massage and elevation, soaping and hot baths.

The author does not describe the details of the actual operation, but merely the means adopted to control haemorrhage.

"Three pairs of large clamps, such as Moynihan uses for gastro-enterostomy, or Lynn Thomas for amputation at the hip-joint, are prepared by covering one of the blades with rubber tubing.

"A small incision is made in front near the root of the penis and the unsheathed blade of one clamp is inserted and pushed on towards the perinaeum in the line of junction of the healthy and unhealthy portions of the scrotum. This is quite easy. The blades are then firmly closed, the outer sheathed blade resting on the surface of the skin.

"A similar proceeding is effected on the other side. The skin incisions are rapidly and boldly made as far as the points of these clamps.

"After this, another clamp, both of whose blades are sheathed, is applied across the perinaeum by holding the scrotum forwards, and the mass is cut away.

"There has been, in this way, practically no bleeding, and, after the usual accompanying hydroceles have been dealt with, the vessels are picked up and tied.

"Those which can be seen are dealt with first, and then by loosening the clamps, the smaller ones become evident. The operation is completed in the usual manner."

A. A.

MACKENZIE (J.). Influenza : Preliminary Note on a Fatal Pneumococcal Infection and its Suggested Spread from Sheep to Man.—*Jl. Roy. Army Med. Corps.* 1920. Dec. Vol. 35. No. 6. pp. 481-484.

In October 1919 a severe epidemic of "influenza" broke out among corps of Indian followers in Lahore cantonment, remarkable in that it was the only sharply defined epidemic of the kind in that year in India and that it was restricted to the north end of the cantonment. Up to November 19 there were 689 admissions and 196 deaths. On that date the author learned that sheep penned in the northern part of the cantonment were dying in numbers of a mysterious malady, and he remarks that the unit nearest the sheep pens consisted of the personnel of the cattle dépôt itself, and in this unit cases were very numerous. It is noted that after September the main road which parted pens and cantonment was thick with dust, which must have blown from one to the other. The infection of a unit a mile away could be explained by the employment of a fatigue party of 52 men to erect sheep pens a fortnight before the unit figured on the returns.

A post-mortem of a sheep showed pneumococcal bronchopneumonia, with Gram-positive capsulated diplococci indistinguishable from Fraenkel's pneumococcus in lungs and heart blood, and post-mortems of two unselected human cases revealed bronchopneumonia with pneumococci in the lungs and blood. The author suggests that a type of pneumococcus, rendered highly virulent by passage through sheep had either grafted itself on to mild influenza or itself produced the fatal type of disease described, but admits that the investigation was far from complete.

A. G. B.

ABBATUCCI. Considérations cliniques sur l'épidémie de grippe de 1918-1919 observée à l'hôpital de Fez (Maroc).—*Ann. de Méd. et de Pharm. Colon.* Paris. 1920. Dec. Vol. 18. pp. 76-80.

The predominant clinical form of the disease in this epidemic of grippe was the pulmonary, without stethoscopic signs, but with fever and pain and often a sooty sputum. Among complications pleurisy and suppurative pericarditis occurred. An interesting phenomenon during the epidemic was the frequency of liver abscess, as if the influenza had actually made things favourable for the specific amoeba. These amoebic abscesses were difficult to diagnose. The author remarks upon the long time—up to two months—that the contagion of influenza remains active.

A. A.

GREIG (E. D. W.). Observations on the Pathology and Bacteriology of Influenza.—*Indian Jl. Med. Res.* 1920. Oct. Vol. 8. No. 2. pp. 326-355.

The author made necropsies on 60 cases of fatal influenza among Indian troops during the height of the second influenza wave at Karachi in the autumn of 1918, and in this paper, which was read at Paris by Col. Greig as delegate for the Government of India to the *Commission Sanitaire des Pays Alliés*, the pathology and bacteriology of the disease are studied with references to work in America. The author found that the pathological lesions in the respiratory system

took the form of an acute bronchiolitis without serious involvement of the pleura, such as empyema. Other serous membranes, viz., the pericardium and peritoneum, were not attacked. The organisms associated with the lesions were *B. influenzae* and the pneumococcus. No part was played by the haemolytic streptococcus in the causation of the disease.

A. G. B.

DUTTON (H. R.). **Note on a Recent Outbreak of Influenza.**—*Indian Med. Gaz.* 1921. Feb. Vol. 56. No. 2. p. 56.

The outbreak, which comprised 82 cases, occurred in the Bhagalpur Jail, in October, 1920. The noteworthy points are that the early cases were mild, severe chest cases not occurring until eight days after first appearance of the disease; that gradually increasing injections (1 cc. up to 3 cc.) of vaccine appeared to have great curative effect in bronchopneumonic cases; that general prophylactic inoculation of vaccine proved of great value, no case having occurred after the second dose and only one after the first; and that uncomplicated cases were quickly cured with sodium bicarbonate and cinnamon, and open-air treatment.

A. A.

MELHORN (K. C.). **Smallpox in Haiti.**—*U. S. Nav. Med. Bull.* 1921. Apr. Vol. 15. No. 2. p. 492.

Alastrim (West Indian modified smallpox), having recently been introduced from Jamaica, is now epidemic in Haiti and is spreading rapidly. No special peculiarities have been observed in the course and symptoms of the disease. When the scabs drop off there is no pitting, only a localized loss of pigment lasting for about four weeks.

A. A.

BROWN (C. J.). **Smallpox in Port au Prince, Haiti.**—*U. S. Nav. Med. Bull.* 1921. July. Vol. 15. No. 3. pp. 695-700. With 12 figs.

The chief interest of this epidemic is that, though there were many severe cases and the mortality in hospital was 9 per cent, it appears to have been introduced from Jamaica at a time when (Aug., 1920) the type of disease there was alastrim [see this *Bulletin*, Vol. 17, pp. 248-9]. The original case left Jamaica in August, touched at Cuba, entered Haiti on August 20, and reached Port au Prince six days later [the date of onset is not given]. Since then 3,059 persons have been under treatment. The first cases were mild, but as time went on they gradually increased in severity, and the mortality-rate slowly but steadily rose. An account of the disease is given with several photographs; it appears to have been typical smallpox. Patients were vaccinated at various stages, and it is concluded that "a patient is immune to cowpox from the beginning of the eruption to the end of desquamation."

A. G. B.

DE KORTE (W. E.). **What is Amaas ?** [Correspondence.]—*S. African Med. Rec.* 1921. June 11. Vol. 19. No. 11. p. 219.

The author writes :—

" If a hanging-drop preparation of the contents of a varicella vesicle and a similar preparation of an amaas or smallpox vesicle before maturation be examined side by side under the microscope, a very marked difference between the two will be observed, so much so that the diagnosis of the two diseases may be made by microscopic examination alone. In the case of the contents of the varicella vesicle the hanging drop will show a transparent medium, in which will be observed a few extremely motile transparent amoeboid bodies. In the contents of the smallpox or amaas vesicle a great number of highly refractile circular elements about the size of red corpuscles will be obvious. The two pictures are so different as to render any error or confusion almost impossible."

A. G. B.

LEAKE (James P.) & FORCE (John N.). **Inoculation of Alastrim or West Indian Smallpox.**—*Proc. Soc. Experim. Biol. & Med.* 1921. Apr. 20. Vol. 18. No. 7. pp. 248-249.

— & ——. **Experiments on Alastrim.**—*Public Health Report.* 1921. June 24. Vol. 36. No. 25. pp. 1437-1443.

Accounts of alastrim usually state that the disease is most prevalent among negroes, and tends to " involve the more superficial layers of the skin in the vesicular stage, with relatively little primary umbilication, streptococcal infection, severe pustulation, or permanent scarring."

" Comparisons of its clinical immunology with that of accepted smallpox have been obscured by the non-recognition of three facts: the acceleration of the reaction to inoculation of vaccine virus to immune individuals, the frequent absence of complete immunity to vaccine virus after an attack of smallpox [62 per cent. vaccinas and vaccinoids were produced by FORCE and STEVENS on vaccinating young adults who gave a history of previous smallpox] and the occasional absence of immunity to smallpox after successful vaccination or after an attack of smallpox itself."

The authors performed inoculations to determine the immunological relationship of alastrim. The material consisted of pustule contents preserved in 0.5 per cent. phenol at a low temperature for several months, from two Jamaican cases, and crusts preserved dry for two weeks from a case in Haiti. The subjects were two *Macacus rhesus*. The result of the first experiment was that :

" A vesico-papular eruption was produced by the inoculation of two monkeys with crusts from Haitian alastrim and pustule contents from Jamaican alastrim. This eruption was similar to that produced in three monkeys some months previously, inoculated by one of the authors (J. P. L.) with pustule contents from a case of smallpox occurring in the district of Columbia."

Thirteen days after the inoculation with alastrim material, monkey 1 and a control were inoculated with a highly potent vaccine virus, and monkey 2 with alastrim material. The latter gave no reaction; the control showed a typical vaccinia; monkey 1 was refractory. In a third experiment the alastrim material was inoculated cutaneously on a rabbit without result; nine days later the rabbit was inoculated with scrapings from the eruption produced in the monkey, and after other nine days with dilution of a potent vaccine virus; only a few scattered

lesions were produced, though there was a confluent eruption on a control rabbit. The experiment was repeated on another rabbit with the same result.

"Two rabbits were therefore immunized to alastrim to such a degree that, though they showed no eruption, they were later observed to be almost completely immune to vaccine virus, the scanty lesions being in no sense imperfect in development but definitely accelerated, as in vaccinoid."

In a final experiment rabbits previously inoculated with vaccine virus gave positive intracutaneous reactions to smallpox crusts, alastrim material and vaccine virus, but remained negative to chickenpox crusts.

The paper concludes with the statement :—

"The fact that definite immunity to vaccinia is produced by previous inoculation with alastrim is additional evidence of the essential identity of alastrim with smallpox."

A. G. B.

BRAAFLADT (Louis H.). **Blastomycosis.**—*China Med. Jl.* 1921. Jan. Vol. 35. No. 1. pp. 30–35.

The author after an introductory review of the subject, gives abstracts of two cases of blastomycosis, one pulmonary, the other affecting the mammae. The bacteriological and microscopic characters of the infecting organism are described.

A. A.

LOZADA BENAVENTE (Samuel). **Contribución al estudio de la blastomycosis.**—*An. Facul. de Med. de Lima.* 1920. Sept.–Oct.; Nov.–Dec Vol. 6, Nos. 17 and 18. pp. 109–121. With 12 text-figs. pp. 232–249. With 2 plates.

The writer quotes SAGARNAGA'S opinion that the woody territory of Bolivia lying between the eastern watershed of the Cordillera and the frontiers of Peru, Brazil, Paraguay and the Argentine, is the cradle of most South American tropical disease and especially of blastomycosis. His own experience of blastomycosis has been gained in this country. He divides the clinical course of the disease into four periods, each of which he describes in detail.

Discussing the etiology of this form of blastomycosis, the writer suggests that a vector (unknown) may be concerned in its spread. He points out that the initial lesion is on exposed parts of the body and that the disease is not easily contagious, though auto-inoculation may result from scratching.

Diagnosis is made from leishmaniasis by the discovery of the causal organism and from syphilis by the absence of the Wassermann reaction, and by the fact that arsenic, mercury and iodides are useless in treatment. Syphilis tends to attack the hard palate, blastomycosis the soft palate. Finally, in 17 cases the writer has obtained a positive tuberculin reaction to which he attaches importance.

The disease is curable in the first stage by antiseptic treatment, though excision is to be preferred. The later stages are treated by intravenous injections of tartar emetic, starting with small doses and increasing these up to the limit of tolerance and then gradually decreasing. The treatment should be continued for at least a year after the cicatrization of the lesions.

J. Rosslyn Earp.

CASTELLANI (Aldo), DOUGLAS (MacKenzie) & THOMSON (T.). **Notes on Certain Forms of Bronchitis clinically resembling Tuberculosis : Bronchohemisporosis, Bronchomoniliasis, Bronchoanaeromycosis.** — *Jl. Trop. Med. & Hyg.* 1921. June 1. Vol. 24. No. 11. pp. 149-152. With 11 figs.

Remarks on Bronchohemisporosis, Bronchomoniliasis, and Bronchoanaeromycosis, affections mostly occurring in the tropics, but not uncommon in the temperate zones, and simulating phthisis.

Bronchohemisporosis is due to fungi of the genus *Hemispora*. In the mild type there is cough and muco-purulent expectoration, but not any fever; the severe type, which sometimes develops after a tonsillitis caused by the same fungus, closely resembles phthisis.

Bronchomoniliasis is due to fungi of the genus *Monilia*, of which the author enumerates four probably pathogenic species not always easy of determination unless the material be fresh. Here again the mild type is accompanied merely by cough and muco-purulent expectoration without fever, and the severe type closely resembles phthisis. In the diagnosis of this disease it is necessary to remember the existence of merely saprophytic moniliasis which may be present in phthisis and other chronic conditions.

Bronchoanaeromycosis is associated with an anaerobic bacillus-like organism, provisionally named *Anaeromyces* by the authors, who place it near *Mycobacterium* and *Corynebacterium* of Lehmann and Neumann and *Nocardia* of Toni and Trevisan. The organism has been isolated in numerous cases of bronchitis contracted in Ceylon, the Malay States, Serbia, Italy, France, and England. The cases are of two kinds, the haemorrhagic type resembling pulmonary tuberculosis, and the muco-purulent type resembling sub-acute or chronic bronchitis. The authors are inclined to regard the organism as pathogenic to man, although, experimentally, it has not proved very hurtful to guineapigs.

The paper is illustrated by two plates.

A. A.

MACFIE (J. W. S.) & INGRAM (A.). **Bronchomoniliasis complicating Pulmonary Tuberculosis in a Native of the Gold Coast, West Africa.** — *Ann. Trop. Med. & Parasit.* 1921. Apr. 27. Vol. 15. No. 1. pp. 53-58.

Though bronchomoniliasis has been found in many parts of the world, the authors do not think it has been recorded from West Africa. The patient, a man aged 25, was admitted on September 29 with a history of illness, accompanied by cough for at least 18 months. There were areas of dullness over both lungs. Cough was frequent, sputum copious, fever irregular. He died on November 8, as the result of haemoptysis. The first sputum examined had the appearance of saliva containing small particles of macerated bread. A second contained numerous yeast-like cells, from which cultures of *Monilia* were started on maltose agar and glucose agar. In a third specimen, which contained few *Monilia* cells, probably as a result of potassium iodide treatment, tubercle bacilli were detected. Post-mortem both lungs were found to be tuberculous. The left lung was collapsed and the pleural cavity partially filled with creamy exudate. In this exudate and in the thickened pleura over the lung, *Monilia* was present. The organism

belonged to the *Tropicalis* group of CASTELLANI and CHALMERS, and closely resembled in bio-chemical reactions *M. nivea*, Cast. (1910). This species produces acid and gas in raffinose, a reaction which the authors were unable to test.*

A. G. B.

DE MELLO (Froilano) & DO CARMO VÁS (J. A.). [In Portuguese and French.] **Contribuição para o estudo das aspergillaceas indianas.—** **Contribution à l'étude des aspergillées indiennes.**—*Arquivos Indopartugueses de Med. e Historia Nat.* Nova Goa. 1921. Vol. 1. pp. 43–99. With 5 plates.

A catalogue of the species of *Aspergillus* and *Sterigmatocystis* with notes on those identified in the author's laboratory.

A. A.

YOUNG (W. A.). **A Brief Note of the Histology of Goundou.**—*Jl. Trop. Med. & Hyg.* 1921. Mar. 15. Vol. 24. No. 6. pp. 76–77. With 1 text-fig.

The general appearance of sections of a goundou examined by the author were those of a myxoma with scattered ill-defined masses of protoplasm and syncytia having up to 20 and 30 nuclei. The significant embryonic nature of this tissue is emphasized.

A. A.

WATTS (R. C.) & MOHAMED (S. G.). **Incidence of Gingivitis among the Indian Troops.**—*Indian Med. Gaz.* 1921. Mar. Vol. 56. No. 3. pp. 97–98.

The examination of 300 men taken indiscriminately from Gurkha regiments disclosed 44·5 per cent. with good teeth, 26·5 per cent. with bad, and 29 per cent. with gingivitis. Whatever may have been the bacterial flora to begin with, secondary infection with spirochaetes, streptotriches and vibrios invariably predominated: in 49 per cent. of cases, including some classified as "good teeth," Vincent's spirillum and *Bacillus fusiformis* were present. Amoebae were seen in 3 per cent. and in two out of nine cases had ingested red blood cells. *Trichomonas intestinalis* was found in 0·5 per cent.

Fifteen bad spirillar cases were treated with novarsenobillon (0·45 gm. intravenous, and solution locally), and with the disappearance of the organisms the condition of the teeth improved marvellously in all: in the other four there was no improvement, because a coccal infection—probably the original cause—remained.

The authors refer to recorded cases of badly infected wounds caused by contact with infected teeth.

A. A.

* In a subsequent note [*Ann. Trop. Med. & Parasit.* Vol. 15. No. 3. p. 285] the authors report that neither acid nor gas is produced in raffinose. They therefore consider the fungus a new species, which they name *Monilia accraensis*. The same organism has been obtained from the sputum of another native.

MICHAEL (W. H.). **Treatment of the "West Indian Chancroid."**—*U.S. Nav. Med. Bull.* 1921. Apr. Vol. 15. No. 2. pp. 412-414.

In the author's opinion this lesion is always syphilitic.

When a man reports with a sore he receives an intravenous injection of 0.6 gm. of arsphenamine, which is repeated at the end of a week. If the man is not seen until the sore has been in existence for a week or more he receives a third or even a fourth dose. Arsphenamine has been used, until recently, because neo-arsphenamine, which is preferable, was not available.

Only two cases of secondary syphilis have developed in the author's district since this routine treatment was adopted, and this confirms the author in his belief that the lesion is syphilitic, because in neither of these cases was the sore diagnosed and treated as such.

A. A.

i. RAVAUT (P.) & SCHEIKEVITCH. **Lymphogranulomatose des ganglions de l'aîne. Fréquence inusitée de cette affection (présentation de pièce).**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1921. Mar. 10. 3rd Series. Vol. 45. No. 8. pp. 310-312.

ii. RAVAUT (Paul). **Le traitement de l'affection dite "lymphogranulomatose inguinale subaiguë" par les injections d'émétine.**—*Ibid.* June 16. No. 20. pp. 865-874.

i. In the course of a few weeks six cases of this peculiar affection of the inguinal glands were seen by these authors, who refer it to the subacute inguinal lymphogranuloma described by Professor NICOLAS of Lyons, a morbid entity unconnected with syphilis, or soft chancre, or tubercle, or bubonic plague.

An abstract of one typical case is given; a man of 61 years, exhibiting a painless non-inflammatory tumour the size of a pigeon's egg in the left groin. The only lesion visible was a minute ulcer like a burst herpes vesicle, which had appeared a few days after irregular intercourse. This disappeared completely after application of iodine; but 15 days thereafter the swelling in the groin had increased and showed signs of suppuration. The removal of the mass, which included glands and adherent skin and connective tissue, necessitated the dissection of the whole of Scarpa's triangle. Section displayed a remarkably hard fibrous network with relics of gland, infiltrated with serous pus. No parasites were identified in cultures, and ultramicroscope investigations gave no result.

ii. Since the above communication the author has seen thirteen more cases of subacute inguinal lymphogranuloma. In the pus from one of these, he observed macrophages and large amoeboid cells, the latter exhibiting lively movements when warmed, and having much more the look of *Entamoeba coli* than of *E. histolytica*. This observation supplied the wanted clue to treatment, and 15 days after the commencement of emetine injections the patient in this case was cured. Encouraged by this success two more cases of a chronic nature were treated with emetine and were cured in ten and fifteen days; in a fourth case the action of emetine was much slower and less satisfactory, the tumour subsiding but a deep subcutaneous fistula persisting.

The doses of emetine have ranged between 4 and 10 cgm. daily. In the three conspicuously successful cases the beginning of the emetine treatment was followed by an increased discharge, the secretion becoming sanguineous and containing blackish clots and débris of sloughs.

Colonial medical officers who saw the cases were inclined to liken them to climatic bubo, and the author suggests a search for amoebae, and a trial of emetine treatment in that affection.

A. A.

HUTCHISON (H. S.) & PATEL (P. T.). **A Preliminary Study of the Etiology of Osteomalacia in the City of Bombay.**—*Glasgow Med. Jl.* 1921. Apr. Vol. 95. No. 4. pp. 241–255. With 5 charts in text.

Bombay is a good field for the study of the etiology of osteomalacia, since many distinct classes having different habits and social customs and a different dietary live there under the same meteorological conditions and practically the same imperfect general sanitary conditions.

From the records of 7,156 labours in the hospitals for women and children it appears that complications in abnormal labours and complications specifically due to osteomalacia are, respectively, more than six, and more than five per cent. more numerous among Mahomedan women than among the women of all other classes of the community combined.

From a study of the conditions of life of the different classes of the community it appears that the circumstances differentiating the Mahomedan women are lack of fresh air and exercise due to a particularly rigid observance of the purdah system.

There is no reason to think that child marriage and protracted lactation, and no evidence that any dietetic deficiency, are factors of any importance in the causation of osteomalacia in Bombay; but the more or less sudden onset associated with fever in many cases and the rapid softening of the bones suggest the possibility of an infection.

The authors compare their conclusions with those of Dr. Agnes SCOTT from her observations in Northern India, which are that the houses wherein osteomalacia occurs are dark, damp, ill-ventilated, usually overcrowded, and for the most part in very insanitary surroundings; that the disease is not confined to the very poor; and that women who lead a sedentary and secluded life appear to be those chiefly affected.

A. A.

KOFOID (C. A.). **Hookworm and Amoebiasis in California.**—Reprinted from the *California State Jl. Med.* 1920. Sept. 13 pp.

Hookworm.—Hookworm infections in California are mainly importations from the East, from Mexico, or from the Southern States. The most important centre is among the miners in Amador County, whither infection was brought from the infected mines of Europe. Of 2,747 miners examined, 10·8 per cent. were found infected in one examination. Other investigations revealed 7 per cent. infection among 507 Japanese labourers and 6 per cent. among 154 university students, all but one of foreign origin.

“Investigation made by me in the United States Army of the Psychologic Board's ratings of 10,000 men with and without hookworm, revealed the fact that among able-bodied, healthy men hookworm infection was accompanied by an average drop of twenty-seven points, or 22·3 per cent. in mental rating below that attained by men of the same class in whom no infection was detected.”

Evidence of the proneness of hookworm infected men to sickness of various kinds, including pneumonia, is given from the Camp Bowie statistics [this *Bulletin*, 1921, Supplement, No. 2, p. 108]. Conditions in California, climatic and sanitary, are all in favour of the perpetuation of the infection.

Amoebiasis.—This is of even graver importance to the State.

"Amoebiasis is neither tropical nor dysenteric by necessity. It is an insidious infection appearing in acute form as dysentery but may accompany any intestinal disorder, constipation, appendicitis, enterocolitis, or appear in chronic cases as hepatic, pulmonary, or brain abscess, as enlarged spleen resistant to quinine, joint or long bone rheumatism, or as an obscure and rebellious skin infection."

[Are all these forms well established?]

Evidence is given of the increased percentage of infection in 2,300 American soldiers after their return from France, 12·8 per cent. as against 4·3 in 576 home service soldiers.

[The significance of these figures is lessened by the fact that a similar difference is found in the hookworm percentages, 6·9 and 3·8, for it seems improbable that this was the result of service in Europe.]

The examination was single. Of ex-service men in the University 53 per cent. were found to be carriers: here there were six examinations. The author concludes that there is "abundant evidence that the number of carriers of amoebiasis among the civil population of this country has been greatly increased by the return of the overseas men."

The author detected several cases of familial infection, one of which he cites: a soldier in the Philippines who returned with no history of dysentery in 1908. His house contained modern sanitary conveniences. Amoebiasis was detected in one of his children and on examination of the family it was found that both parents and the three children were all infected.

In 122 men in the quicksilver mines were found 40 per cent. of infections.

A. G. B.

ROCKEFELLER FOUNDATION. **Report on Hookworm Infection Survey and Malaria Survey of Porto Rico. From December 28, 1919, to January 28, 1920.** By John B. GRANT, M.D. 67 pp. With 35 text-figs. No. 7525. 1920. Nov. 13. International Health Board, 61, Broadway, New York City. [Lithographed Report for limited distribution.]

This report contains, besides the section on hookworm and malaria, an account of the public health activities of the island. Under economic conditions it is stated that those of the rural labourers, who constitute 70 per cent. of the population of a million and a quarter, can only be described as precarious. Instances of malnutrition are by no means infrequent. The Bureau of Labour report speaks of investigations in the labourers' homes revealing "the most horrible scenes of absolute misery, caused rather by low wages than by the high cost of living." In the coffee industry the daily wage is barely sufficient to pay the price of one meal. It is noted also that the island is over populated, containing 350 persons to the square mile.

Hookworm was discovered in Porto Rico by ASHFORD at the end of the last century. In 1904 an "Anemia Commission" was appointed to study and treat the disease; and the work continued till 1910, during which period \$243,000 were spent and 287,658 patients treated. Hospitals and dispensaries for treatment were established and the attempt

was made to educate the people in the avoidance of infection and of soil pollution. Work of the kind went on—with less energy after 1910—till an examination of Porto Rico soldiers at Camp Las Casas, in 1918, revealed an incidence of 94 per cent. infection. Hence the present survey, in which ten representative areas were chosen. It is significant that “the first few places in which specimens were examined showed such a high hookworm incidence that it was deemed unnecessary to use either the Kofoid-Barber or the centrifuge techniques of specimen examination. . . . When the infection rate is in the vicinity of 95 per cent. very little can be gained by using the more accurate methods.” Of the 2,120 persons examined, 1712, or 80·8 per cent., were found infected. The table shows the details.

The haemoglobin index in 1,071 positive cases was 64·1 per cent., against 70·3 in 157 negative persons. The conclusions of the Hookworm Survey are that, except in urban centres, the incidence in Porto Rico is exceedingly high and that, as a rule, the severity of infection increases in direct proportion to the altitude. “The highest infection percentage is to be found in the coffee districts, where the altitude is high, and where incidentally there are the worst economic conditions to be found in Porto Rico. The problem of hookworm control centres around the prevention of soil pollution,” and it is stated elsewhere in the report that on the sugar, coffee and tobacco plantations there is an entire absence of latrine accommodation, and of latrines elsewhere not one per cent. is sanitary.

For the malarial survey a thin blood smear was taken from persons bringing faecal specimens. Of 449 examined, 73, or 16·3 per cent, were found infected (see table). No special record was kept of the types of parasites, but *P. vivax* predominated.

Area and District.	Examined for Hook- worm Disease.	Found Positive.	Examined for Malaria.	Found Positive.
Total	2,120	p. c. 80·8	449	p. c. 16·3
Coast District (Sugar)	646	82·0	212	31·1
Valley District (Tobacco)	462	83·8	90	5·6
Mountain District (Coffee)	761	97·5	147	1·4
Coast District San Juan (Urban).	251	21·1	—	—

A. G. B.

SALM (A. C.). **La maladie des oedèmes à Java.**—*Bull. Soc. Path. Exot.* 1921. June 8. Vol. 14. No. 6. pp. 333-337.

This disease was first noticed in the villages in 1918, and in 1919 several patients sought admission to hospital for it, chiefly because of scarcity of food. In three months, of 600 admissions 137 were cases of oedema. In 87 instances it was not possible to attribute the condition to ankylostome infection or any known disease, and of the 87, eight recovered, 12 were in fair condition at the end of three months and 47 had died. The disease occurs in both sexes at all ages. The oedema appears at first on the feet and lower limbs—later elsewhere. The genital parts are often greatly swollen. Emaciation, almost always present, is masked by the oedema. The skin is dry and the nails lose their gloss.

The knee-jerks are normal and no paralysis has been seen. At autopsy the organs are found atrophied. Death, when it occurs, is with extreme enfeeblement and diarrhoea.

The disease is due to defective diet. Van LANGEN found that there was a lack of the lipochrome, lutein, in the blood, and a great deficiency in fat. He attributes the disease to a lack of fat in the dietary. From the beginning of 1917 rice rose in price for various reasons attributable to the war, and the Javanese were driven to less nutritious foodstuffs, such as manioc. Since then there have been epidemics of influenza and cholera, the result of which was to aggravate the poverty as well as to send up the mortality-rate. In 1919 this was 45.6 per mille. The number of persons with oedema is now decreasing.

A. G. B.

VAMPRÉ (Enjolras). **Dois novos casos de mal de engasgo.** [Two New Cases of "Mal de engasgo."]—*Bol. Soc. Med. e Cirurg. de S. Paulo, Brazil.* 1920-21. Oct.-Feb. Vol. 3. 2nd Ser. Nos. 8-12. p. 326.

— **Nova contribuição ao estudo do "Mal de engasgo."**—*Ann. Paulist. Med. e Cirurg.* 1921. Feb. Year 9. Vol. 12. No. 2. pp. 25-38.

The condition known locally in Brazil as "Mal de engasgo," literally "choking disease," appears to be identical with that more generally denominated "idiopathic dilatation of the oesophagus." The author discusses at considerable length the morbid anatomy of the complaint and argues that the oesophageal dilatation is secondary to a condition of spasm of the cardia. That there is no primary atony of the oesophagus is shown by the fact that in these cases the radioscopic screen reveals vigorous attempts at peristalsis on the part of the oesophageal musculature. The disease, which appears to be common in the Brazilian States of São Paulo and Minas, and in parts of Mexico, is characterized by the onset of severe post-sternal pain after the ingestion of food and ultimate regurgitation of the whole or part of the ingested meal. The etiology of the complaint is obscure. The use of waters containing arsenic or copper has been suggested as a cause, but the author is inclined to attach more importance to the habitual swallowing of scalding coffee. He cites two cases in which marked improvement was brought about by operation having as its object enlargement of the oesophageal opening through the diaphragm.

F. S. Arnold.

CAZAMAIN (Pierre). **Fièvre par morsure de chien.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1921. Mar. 3. 3rd Series. Vol. 45. No. 7. pp. 268-273.

The patient, a sailor aged 21, was bitten on the hand by an enraged dog, whether infected with rabies or not is unknown. He underwent a course of Pasteur treatment lasting a month. Five weeks after the bite, when he had rejoined his ship, the wound became painful and opened, and the epitrochlear and axillary glands enlarged; later there was a scattered macular eruption and fever of recurrent type; no haematozoa

could be detected; quinine was ineffective; the Wassermann was negative. It was concluded that the case was one of spirochaetosis of sodoku type. He received two injections of neosalvarsan and a month later appeared to be well. The author reminds us that sodoku has been communicated by the cat, the weasel, the ferret and the squirrel, and sees no reason why the dog should not play the same part; he calls it, however, dog-bite fever rather than sodoku.

A. G. B.

REVIEWS.

VAUGHAN (Warren T.). [M.D.]. **Influenza: An Epidemiologic Study.**—*Amer. J. Hyg.* Baltimore. Monographic Series. 1921. July. No. 1. 260 pp. With 29 charts and 7 text-figs.

There are many problems in connection with epidemic influenza which still await solution. Is this the same disease (in a more intense form) as that common ailment, the "influenza cold"? What is the relationship of Pfeiffer's *Bacillus influenzae* to each of these conditions? If the diseases are due to the same pathogenic agent, why does the endemic pass into the epidemic form, or extend into a great pandemic at uncertain intervals of time? What is the mode of transmission of the disease? Can a positive clinical diagnosis be made in the absence of confirmation by the bacteriologist? So protean, indeed, are the morbid conditions included under the same name that one might multiply these perplexing questions almost indefinitely.

The identity of the micro-organism, to the effects of which influenza is due, was almost universally admitted until the great pandemic of 1918-20 aroused a general interest in, and a more critical attitude towards, the matter. In the spring of 1918, when influenza in epidemic form was diagnosed in many parts of the world in quick succession or simultaneously, a large proportion of most of the civilized nations, both men and women, young adults and the middle-aged, were mobilized for service of one sort or another in the war. There were ample and well-equipped medical organizations almost everywhere, and the moment seemed to be a favourable one for settling, once and for all, the question of the nature of epidemic influenza. At this time, too, certainly in India and in China there occurred, together with what appeared to be influenza, a good many cases of dengue, a disease the clinical resemblance of which to influenza is well known. In the diagnosis of both diseases, much stress is laid upon the shortness of the incubatory and of the febrile periods, the pains in the limbs and back and the subsequent intense depression which seems out of all proportion to the objective signs. The correct diagnosis of these cases became of the greatest importance. It was therefore decidedly disconcerting when so many negative reports were received from the bacteriological laboratories as to the presence of *B. influenzae* in material sent from cases which had been considered clinically to be examples of influenza.

The uncertainty of animal inoculation; the negative result of many experiments made on the direct infection of man from man; and the difficulty, or even impossibility, of demonstrating *B. influenzae* in a considerable proportion of the cases examined, incline one to turn to other methods of attacking the problem of the true nature of epidemic influenza. Hence, such studies as the one under review are particularly welcome. Although Dr. Vaughan's monograph professes only to be a study of influenza from the epidemiological standpoint, he takes a very broad view of the subject, and, directly or indirectly, deals with most aspects of the disease, and gives answers to several of the questions propounded above.

After an interesting review of the earlier recorded epidemics, in which such evidence as exists as to the nature of the disease is briefly given, Dr. Vaughan deals, in considerable detail, with the influenza epidemics which have occurred during the last thirty years. In the epidemics which prevailed in the years following 1889, it is well known that the disease was particularly fatal to middle-aged and elderly persons. In the latest pandemic of 1918-20, the common type of the disease appears to have undergone a considerable change. When it first appeared it was of a very mild character. This, however, was followed in the autumn of 1918 and the early part of 1919 by a very severe form, and one in which the chief sufferers were young adults.

In America, during the four autumn months of 1918, 338,343 cases of influenza (presumably in the army alone) were reported to the Surgeon-General—one out of every four men in the camps had influenza. Again, one out of every twenty-four men encamped in America had pneumonia;

and, among the troops in that country, one out of every sixty-seven died. Between September 1st and December 31st, 1918, it is estimated that about half a million deaths from influenza and its direct complications occurred in the United States.

Dr. Vaughan informs us that "among the Esquimaux in Alaska the death-roll was terrific. Whole villages of Esquimaux lost their entire adult population. . . . Many infants were frozen in their dead mothers' arms." It is impossible to ascertain how heavy the mortality was in India, China, and the "silent areas" of Central Asia. In the former country the estimate of five million deaths from influenza and pneumonia is certainly not an exaggerated one.

When one contrasts these appalling figures with the relative mildness of former epidemics of influenza, it is difficult to avoid doubts as to whether one is considering the ravages of the same disease. To attempt to explain the difference in virulence by differences in susceptibility or by the concurrence of other secondary infecting micro-organisms seems to be a pure assumption, and not in any way a satisfactory solution of the difficulty. On this point, Dr. Vaughan gives several quotations from various authorities, but leaves the matter undecided, at least in the mind of the reviewer.

As regards the original source or sources from which the great pandemics of influenza have started in the past, there has been much conjecture. Certainly, in some cases, epidemiological evidence seems to confirm the general impression that the disease began in the east, and travelled in a westerly direction. In the latter part of the last century, the epidemics in England were popularly called the "Russian" influenza; and there is some reason to believe that China has sometimes been the focus from which epidemics have arisen. Dr. Vaughan considers that the universal pandemic of 1918 probably originated in the United States; that it was carried by troops of the American Expeditionary Force to France; that it spread thence throughout the world; and that the severe recrudescence in the autumn of the same year, in the United States, was due to a reimportation into that country by troops returning from Europe. He admits, however, the possibility of another origin, either in France or in China. The charts which he gives certainly lend considerable support to his opinion. But it must be remembered that, on account of the war, the reports from many parts of Europe and Asia are very incomplete.

At the end of January, 1920, when the recurrent epidemic was at its height in Boston, Dr. Vaughan, assisted by another physician and by thirteen "trained social service workers," made a sickness census of 10,000 inhabitants. Six districts in the city were selected, the inhabitants of which were regarded as representatives of six different economic and social groups, from the overcrowded and very poor to the well-to-do and moderately wealthy classes. Statistical data of each individual, his economic status, the sanitary state, etc., of the dwelling were recorded, together with particulars of all cases of illness during the 1918-19 or the 1920 influenza epidemics, or during the intervals. All these records were reviewed by the author, who returned for correction obvious inaccuracies, or any concerning which further information was required. As the result of this searching inquiry a quantity of information was obtained on such points as the actual morbidity, its relation to sex, age, occupation, original nationality in the case of emigrants, mortality, the effects of overcrowding, domestic cleanliness, etc. The inquiry seems to have been conducted with great thoroughness and ability, and the results recorded cannot fail to be of much value to all epidemiologists.

Dr. Vaughan quotes the statement made on influenza by PARKES, in REYNOLDS' "System of Medicine," 1876, that "on the whole it seems clear that, while persons seldom have a second attack in the same epidemic (though even this may occur), an attack in one does not protect against a subsequent epidemic. Indeed, it has been supposed rather to render the body more liable." As the result of his own investigations in Boston, he finds that "a previous attack, contracted on an average 10 to 17 months

before, conferred no protection whatever against a second attack. On the contrary, the attack-rate was slightly higher in this group than in those who had not previously had the disease."

In the final section of his monograph the author discusses the control of epidemic influenza. As regards prevention of influenza in a community he admits frankly that this is at present impossible, but a good deal can be done to minimise the spread and severity of the disease. There is nothing particularly novel in any of the recommendations made. One can only have recourse to such measures as the education of the public in the nature of influenza, the desirability of the avoidance of crowds, attention to personal hygiene, and so forth. A considerable measure of success, both in America and in other parts of the world, seems to have attended the use of multivalent vaccines.

We congratulate Dr. Vaughan on this excellent study of influenza. The facts are so clearly and attractively laid before one, and are considered from so many points of view, that this monograph will be of the greatest interest to many others besides professed epidemiologists. We notice that Dr. Vaughan's study is No. 1 of the Monographic Series issued by the *American Journal of Hygiene*. If subsequent numbers attain the high standard of this one, the success of the series should be assured.

H. J. Walton.

DANIÉLOPOLU (D.). **Le typhus exanthématique.**—512 pp. With 5 coloured plates and 91 figs. in text. 1919. Bucarest. Inst. d'Arts Graphiques. Charles Göbl, S-sseur J. St. Rasidesco, 16, rue Paris, 16. [Price not stated.]

This work is essentially a thesis on typhus fever, based on the detailed study from both clinical and laboratory standpoints of some 600 cases under observation during the epidemic of 1917-18 in the northern part of Roumania. As commonly happens in extensive epidemics, many of the cases were of a specially virulent type, and it is to this that the author attributes the fact that certain characters of the cerebro-spinal fluid and blood, which he describes, have either not been recorded before, or have been met with as rare phenomena in previous smaller epidemics.

The cerebro-spinal fluid was examined in 210 cases, and was found to be always raised in tension, though to a less degree than in meningitis. In the milder cases the fluid was usually clear and the cell-content under 30 per cmm. In the early stages the cells were lymphocytes only; in the course of the second week, or earlier in severe cases, large mononuclear cells were found, with excentric nucleus, some of which showed a marked basophil reaction of the non-granular protoplasm. It was noted that the earlier the appearance of these basophil mononuclears the worse was the prognosis. Another grave sign was a yellow coloration of the fluid; this was present in 58 of the 210 cases, and when deep and persisting after the fall of temperature, the sign was found to possess an almost uniformly fatal significance.

The blood examination showed an occasional early leucopenic phase, followed in the great majority of cases by a well-marked leucocytosis. In the differential count the author rightly insists on the importance of an absolute count, whereby the number of each variety of leucocyte per cmm. is determined. Such a count shows that, though both polymorphonuclear and mononuclear cells are increased, the increase in mononuclears is the more constant and the more marked of the two. A common experience was to find a slight transitory polymorphonuclear leucocytosis replaced during the second week by a more intense and lasting mononuclear increase. The mononuclear cells consisted principally of abnormal forms, some of which were large ovoid cells, with excentric nucleus, and clear basophil protoplasm, similar to the abnormal cells found in the bone marrow, while others were even larger cells, with abundant clear protoplasm, but not basophil. Lymphocytes of normal type were not greatly increased, nor were myelocytes present in the blood. A point to which great importance is

attached is that the higher grades of leucocytosis were limited to the cases of severe illness with toxic manifestations, so that the prognostic value of the sign came to be regarded in the reverse sense of that which holds for most acute infective processes: thus in 38 cases with a leucocytosis over 20,000, 35 died, giving a mortality of 92 per cent.; in 15 cases with a leucocytosis of 30,000 or over, not one recovered.

A constant feature of all but the mildest cases was found to be a fall of the systolic blood pressure: in 63·6 per cent. of a series of 84 cases in which daily records were taken, the maximum pressure fell to a point between 80 and 90 at some time during the febrile period. The blood pressure curve varied according to the severity of the disease: in cases with marked toxæmia the pressure began to fall during the first few days and remained low or even continued to diminish during the post-febrile phase; in cases of less severity the initial fall was postponed, the minimal point to which tension fell was higher, and some recovery of tension was noted even before the febrile period had come to an end, followed by a marked rise during the early days of apyrexia. The loss of arterial tension is attributed by the author partly to the paralysing effect of toxins on the peripheral vasomotor mechanism, partly to a state of adrenal insufficiency, consequent on degenerative changes in the adrenal glands.

In discussing the general symptomatology of the disease, the author lays stress on the importance of the part played by toxæmia in the more severe forms, and draws special attention to the group of cases in which, after the fall of temperature, the patient remains in a very grave state, with rapid and feeble pulse, low arterial tension, cold and cyanosed extremities, and pronounced nervous symptoms. For this state of profound intoxication he has devised a method of treatment whereby he claims that the toxins are destroyed through the effect of chlorine dissolved in saline solution. The solution consists of 0·40 or 0·50 cgm. chlorine dissolved in 1,000 cc. of hypotonic saline solution (sodium chloride 6·5 per mille); of this 500 cc. are injected intravenously once or twice daily until manifest improvement is produced; as a rule two daily injections are required for a period of one to three days, after which a single daily injection is sufficient. Figures are quoted which indicate remarkable results from this line of treatment, even in apparently desperate cases: thus in a series of cases, all with a leucocytosis above 30,000, of 15 cases not treated, all died; of 17 cases treated, one only died. Again, in the case of patients over 40 with toxæmic symptoms, a type in which treatment had previously seldom been of avail, in 26 cases treated by the author's method only two died, and in one of these death was due not to toxæmia, but to an associated streptococcal septicaemia. It may be asked how far these good results are due more to the fluid than to the antitoxic agent dissolved in it, and it would be interesting to compare the author's results with a series of cases treated with repeated injections of normal saline, thus diluting without attempting to destroy the toxins—a procedure which was sometimes attended with remarkable success in apparently hopeless cases of typhus among the British troops during the occupation of the Caucasus in 1919.

In the treatment of myocardial failure, strophanthin (Merck's crystalline) in doses of 0·25 mgm., given two or three times daily was found effective; preparations of digitalin were also tried, but with disappointing results.

As the record of an exceptional opportunity for observing the manifold aspects of typhus in epidemic form, this book is well worth perusal; the author has the gift not merely of describing symptoms in aggregate, but of drawing a clinical picture; and if in the more theoretical sections the views he advances appear at times to be somewhat speculative, they at least stimulate reflection, and lose nothing in force from the moderate and persuasive way in which they are presented. The fault of the book is redundancy; there is much needless repetition, the same ground being traversed repeatedly, often in almost identical phraseology, in the various sections.

In the chapter on diagnosis no mention is made of the Weil-Felix reaction, the value of which in the diagnosis of doubtful cases has been clearly established.

A. G. Phear.

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BERIBERI: A CRITICAL REVIEW.

By Surgeon Rear-Admiral Sir P. W. BASSETT-SMITH, R.N. (retd.),
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Sectional Editor, Tropical Diseases Bureau.

No great advance has been made during the past few years in our knowledge of the etiology, pathology, or treatment of beriberi. The general consensus of opinion that the disease is only the evidence of an avitamin syndrome which includes a widely spreading group having rickets at one extremity and beriberi at the other, as was described by DARLING in 1915, has received constantly increasing proof.

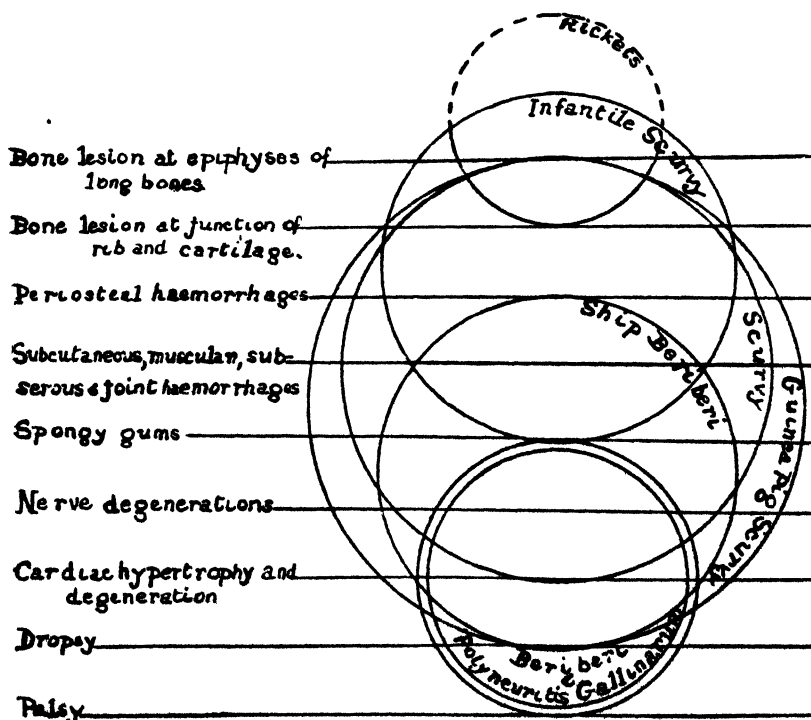


Chart showing affinities of the food deficiency syndromes [after DARLING].

Endemic beriberi was originally considered to be a disease confined to the East in rice-eating natives, or to the crews of ships who had suffered great privation in protracted voyages. Through the researches of STANTON, FRASER and BRADDON, who proved the etiological importance of the various kinds of rice, and of HOLST with regard to the dieting of the seamen, the disease has now been placed under control as far as advice and medical instruction can place it, but year after year evidence is obtained of the wide geographical distribution of its endemic forms.

Cases are reported from the Congo region of Africa among manioc eaters by VAN DEN BRANDEN, from the east of Belgian Congo by WYDOOGHE (J.), and from Madagascar by CLAIR (F.); in Brazil by FRAGA (C.), LINDSAY (J.), and RODRIGUES (F.). The latter author stated in 1920 that beriberi was still of great importance to the Brazilian Navy and was common in the northern part of Brazil; he had no doubt the disease in this country was the same as that recognized in the East. From Cuba and Porto Rico cases are reported; in the latter island, RIDDELL (J.) found that in one regiment there were 56 cases and two deaths and that the disease was distinctly due to food factors. FERNANDEZ MARTINEZ found a poor peasant of Alpujaras with a definite beriberi syndrome produced by a deficiency diet, which was cured by correcting the food; though this is the first case reported from Spain, it is probable that in Castile and in the Basque provinces others would be found if carefully looked for. These instances, with what was previously known, show that beriberi is not dependent upon geographical position, nor on the use of rice as food.

During the War, 1914-18, and since, two groups of cases have been mentioned: (1) in the Mesopotamia force: (2) in southern France among the Indo-Chinese labourers. In the first, at the siege of Kut, the disease was limited to the Europeans, whose ration was biscuit and white bread, with tinned meat; later, horseflesh and brown bread (half white flour and half atta) were issued, and the incidence fell: 155 cases were admitted to hospital, and there was a mortality of 15 per cent. Practically all the cases were of the "wet" type. Starvation and malaria were undoubtedly predisposing causes. SPRAWSON (C. A.) divided the beriberi cases in the Mesopotamian forces into three groups: (1) British cases among the landed troops, (2) Chinese cases among those landed, (3) ship cases from the Indian crews; he was in favour of an infective theory for those on shore, but the condition of the food as taken rather than as rationed was not sufficiently considered. The second group of cases, among the Indo-Chinese, Chinese and Africans landed in France, was described by SICARD (J. A.), LEGGATE (A. R.), ROGER (H.) and MARCHOUX (E.) It is generally stated that these men, after landing, were on a well-considered full diet, equal to that of the Europeans; yet the disease developed among them. Many cases were undoubtedly contracted during the passage and were acute in character; others were latent forms developed during changed conditions of work, and after an *influenza outbreak*, which lowered resistance. SICARD and ROGER, from a large experience at Marseilles (228 cases), state that in no instance could a spread of infection from the sick to the healthy be traced, and that there was no danger of conveying the disease to the indigenous population by landing the cases; they note that the supposed epidemics in France described by CHANTEMESSE and RAYMOND were more like scurvy than beriberi.

From a *pathological* point of view little has been done except by the Japanese. SICARD in three post-mortems made at Marseilles found

congestion and haemorrhage in the stomach and intestines, with degeneration of the Schwann areas of the large nerves, but without interstitial neuritis.

KIMURA (O.), in a monograph on the nerve changes in beriberi, shows that these are degenerative and not inflammatory. The first perceptible signs of degeneration appear in the axis cylinders, but peri-axial changes also occur; the destructive products are absorbed locally, and regenerative processes are found by the side of acute degenerative changes. Primary damage of the central nervous system may occur in acute cases. The hypertrophy and dilatation of the heart are not constant and essential characters, but in prolonged experimental cases the muscle fibres show marked fatty changes.

HONDA (K.), from 45 post-mortem examinations, describes changes in the nervous system, intestines, muscles and bones. The vagus and sympathetic nerves are much less affected than the spinal nerves, and in the peripheral nerves the coarse fibres degenerate much more than the fine fibres. The changes in the ganglionic cells of the spinal cord were much less marked than they are supposed to be, and do not advance beyond a degree that can be quickly recovered from, the changes being partly toxic and partly secondary ascending. It is the active degeneration of the Schwann cells in the sheath that causes the destruction of the nerve fibres; these degenerative masses act as foreign bodies and an irritant to the adventitious cells, which increase in number and wander into the perivascular spaces. Fatty degeneration of the muscle fibres does not run parallel with the nerve changes and is toxic in origin; the susceptibility of the heart's action is mainly due to the structural changes in the cardiac muscles, a direct result of the toxin.

In infantile beriberi he states that the loss of voice is undoubtedly due to definite changes in the nerves and the muscles supplied by them.

Thus with both authors the pathological evidences are in favour of a direct toxin and secondary nerve changes. With regard to the question whether there is an increased pressure of the cerebro-spinal fluid, the results are conflicting. SICARD found none, but OHIDA (H.) registered in acute cases a pressure as high as 280 mm. and as low as 100 mm. in slight ones. MUIRA has noted that when the cerebro-spinal tension is high the blood pressure may be low. This high pressure may account for the vomiting in late severe cases and is always of bad prognosis.

Both in man and in experimental beriberi an increase in size of the suprarenals, through congestion and true hypertrophy, has been found by SHIMBO (M.), MIDORIKAWA (K.), OHNO (S.) and McCARRISON (R.) with an increased adrenalin output, as is also found in scurvy; the other glands of internal secretion are generally atrophied. Various evidences of changes in metabolic activity have been noted.

ARIMA (E.) found an increase in the non-protein nitrogen content in the blood, from 45 to 65 mgm. as compared with that of healthy Koreans, which was 28 to 37 mgm.; in uraemia 200 mgm. may be registered. The increase appears to be due to a disturbance in the balance between the kidney excretory function and protein katabolism, and not to cardio-vascular failure.

SUZUKI (T.) has also shown that the nitrogen metabolism of infants is distinctly injured. YOSHIKAWA (I.), YANO (K.) and NEMOTO (I.) found an increase of urea in the blood from 0.06-0.08 in health to 0.07-1.36 in beriberi. Of 11 cases tested, the two with the highest

coefficients died. It is possible that the cardiac failure in beriberi is due to the accumulation of some unknown product in the blood, the elimination of which is coincident with the elimination of urea.

SUZUKI (T.) found a hypoglycemia in nursing beriberi infants, and considers this to be due to an insufficient adrenal function. SUGA (T.), on the contrary, found in acute cases an increase of blood sugar, which decreased during convalescence, and FUNK (C.) described such an increase in experimental avian beriberi. FINDLAY (G. M.), from experiments on birds, shows that there is evidence of nuclein degeneration with chromatolysis of the cells of the central nervous system with a retention of lipoids in the adrenal cortex, that the nucleic acid of the brain and liver of affected birds was decreased, and that the administration of vitamin B to birds suffering from beriberi causes a removal of the lipid from the adrenal cortex, an increase in the nucleic acid content of the brain, with the reappearance of Nissl's granules, and disappearance of the paralytic symptoms. From this experimental evidence he deduces that vitamin B is an essential factor in the synthesis in the body of animal nucleic acid.

KAWAKAMI (D.) has produced beriberi in goats by feeding them on polished rice; the pathological changes were similar to those found in other animals.

Etiology.—There have been a few reports in favour of a toxic germ being introduced in diseased rice, but none is convincing, and there is much evidence against the infective nature of the disease. That it is dependent upon a deficiency of the vitamin B in the food is certain, whether this be rice, white flour, manioc or other carbohydrate, but how this acts is still debatable. The theory of VEDDER (E. B.) that the vitamin is a necessary "building up" factor for the nervous system is strongly opposed by FUNK, BRADDON, COOPER and WALSHE and others, and VEDDER in turn disagrees with those who hold the belief that an excess of carbohydrate intake influences the amount of vitamin required.

The purely negative deficiency theory is now to a great extent held to be insufficient, and this is ably discussed by WALSHE (F. M. R.), who believes that it is the defective metabolism of carbohydrates brought about by the deficiency of the vitamins which produces a toxic by-product or *positive* factor as yet unknown (probably an enzyme), and causes an intoxication chiefly affecting the nervous system. This conception is compatible with the food deficiency view and reconciles the toxic theory with it. The three chief characters of beriberi are nervous, cardiac, and oedema. WALSHE holds with the pathologists that the nervous lesions in beriberi are not specific to the disease, for they cannot be distinguished from those of toxic polyneuritis; the cardiac changes are similar to those found in diphtheria, and the oedema is attributable to changes in the suprarenals and their output. LUMIÈRE (A.) considers that in pigeons the vitamin acts as an excito-secretor, and maintains the tone of the organs of digestion. WEILL (E.) and MOURIQUAND (G.) experimentally showed that the paralysis in the acute form is functional, and that definite pathological lesions, such as are found in human beriberi, can only be produced in chronic forms induced in pigeons by special feeding.

The whole subject of the deficiency diseases is one of vast importance and of wide range. The special accessory substances known as vitamins are three:—(1) A fat-soluble vitamin A, which is necessary for growth; (2) A water-soluble vitamin B, or anti-neuritic factor, which is fairly thermostable—namely, can withstand 100° C. for two

hours; and (3) a thermolabile vitamin, or anti-scurvy factor. These facts are well demonstrated, and the distribution of the vitamins in foods has been placed on a practical basis through the work of CHICK and HUME at the Lister Institute, and others. The deficiency diseases are so closely associated that a thorough knowledge of the whole group is essential in the study of the subject. McCARRISON, in India, has carried out some most valuable work on birds and monkeys. He considers that want of vitamins, when associated with a diet too rich in starch, leads to a disordered function of the whole endocrine system, and that this disordered endocrine function leads in turn to imperfect carbohydrate assimilation, disturbance of carbohydrate metabolism, and resultant muscular atrophy. The whole digestive system is very easily disordered by an unnatural diet, and, by this, bacterial invasion of the gastro-intestinal tract and bacterial migration are facilitated. It is probable that there is an *infective* factor at work in many cases described as beriberi, in addition to the essential dietetic factor. He also concludes that a deficiency of certain accessory food factors gives rise to a greatly increased production of adrenalin, and this excessive amount of adrenalin is concerned in the causation of oedema found in many cases.

Ship beriberi holds a place intermediate between true beriberi and scurvy, and it is closely related to the disease found in the Rand miners of South Africa. In cases in the British Navy the development is often very slow, the consumption of rice is not an etiological factor, and the loss of the knee reflex with evidences of peripheral neuritis may not be well marked. HOLST found that its increased frequency in Norwegian ships coincided with three changes of food:—(1) Replacement of salt meat by tinned foods; (2) reduction of the pea ration; (3) replacement of biscuit by soft bread, usually made from white flour. Each of these changes caused a reduction in the anti-neuritic factor. He states that the disease was often *cured by fresh vegetables, potatoes and fruit*, but not always. beer, eggs and oats were also useful.

With regard to the cure of beriberi, the substances which have been found to have prophylactic value are here indicated. In Mesopotamia the use of yeast extracts or "marmite" was very beneficial, and in infantile beriberi "tiqui-tiqui" is specific. SALEEBY (N. M.) found that the hydrolysed yeast extract was more efficient in the infantile disease than the autolysed extract. SHORTEN (J. A.), in experiments with fowls, in which beriberi had been produced by feeding them on Rangoon rice, found that a daily ration of 5 gms., dry, of sun-dried carrots, onions, spinach and cabbage afforded complete protection, and that the vitamin content of these substances was relatively high. He states that these preparations will form a safe substitute for fresh vegetables in a ration for issue to troops.

This statement, at least as regards the prevention of beriberi, must, I think, be received with considerable reserve and requires further proof, as CHICK and HUME give the anti-beriberi value of *fresh* cabbage as nil, and that of onions and carrots as very slight. All authors agree that wheat-embryo, pulses, and yeast, have the highest anti-beriberi values, and that in these the vitamins are not destroyed at a temperature of 100° C., but at 120° the reduction of their activity is very rapid. HARDEN (A.) and ZILVA (S.) have attempted to isolate anti-neuritic substances, mainly in pyridine derivatives, but without any great success. FUNK (C.) and DUTCHER (R. A.) have experimented with

thyroid gland and other substances known to influence carbohydrate metabolism ; their experiments are instructive, but at present of little practical utility.

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DYSENTERY: A REVIEW OF THE LITERATURE OF THE
LAST SIX YEARS.

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PART II.—AMOEBIASIS.

1. *Epidemiology.*

Amoebic Dysentery and Hepatic Abscess.—Prior to the outbreak of war in 1914 amoebiasis was generally regarded as a disease peculiar to the tropics and subtropics, occurring solely as an endemic infection in countries with a mean temperature of 60° F. or over.

Possibly, as DOBELL suggests, the non-recognition of protozoal diseases in Great Britain may be ascribed to a habit of regarding intestinal protozoa as being peculiar to the tropics, so that search for evidence of protozoal disease in temperate countries is unnecessary.

With the advent of war the situation completely altered; from a comparatively few protozoologists trained in intestinal protozoology a new school sprang up, which became more powerful and numerous as the contest dragged on. The stimulus thus given to the subject resulted in the compilation of a large number of statistics, which have been collected and published by DOBELL, his assistants, and a number of workers from the Liverpool School of Tropical Medicine (especially MATTHEWS and MALINS SMITH).

Although a few isolated cases of intestinal amoebiasis and hepatic abscess had been noted before 1914, it was not till 1916 that an acute case of indigenous amoebic dysentery, complicated by hepatic abscess, was studied by WENYON in the London Hospital (quoted by DOBELL); subsequently another acute dysenteric case was recognized by WORSTER-DROUGHT and ROSEWARNE. Later it was noted that "healthy" excretors* of the cysts of *Entamoeba histolytica* were comparatively common, and that about 3 per cent. of the indigenous civil and military population harboured the protozoa; in children 1·8 per cent. and in asylum patients 9·7 per cent. were found infected. In France an acute indigenous case was reported first by ORTICONI and AMEUILLE; DARGEIN recorded an undoubted hepatic abscess, whilst RAVAUT and KROLUNITSKI calculated the proportion of healthy carriers of *Entamoeba histolytica* amongst the French population as high as 5 per cent. Amongst British troops returned from France in 1916–17, no less than 8 per cent. were found to be carriers. Since that date it has come to be recognized that the disease "amoebic dysentery" was comparatively common on the western front, though the proportion of these cases to the total number of "clinical dysenteries" was relatively small, probably less than 1 per cent.

In Holland also, *E. histolytica* occurs as an indigenous infection, and KUENEN records a number of amoebic dysentery cases as well as excretors of the cysts; FISCHER apparently has found the same in Germany. Amoebic dysentery has recently been found indigenous in Spain, Italy and in Australia.

* DOBELL has pointed out the inaccuracy of the term "cyst carrier."
[DOBELL & O'CONNOR. *The Intestinal Protozoa of Man.* p. 7.]

In the Eastern theatres of war amoebic dysentery was a common disease; it was probably more widespread in Mesopotamia than elsewhere; thus LEDINGHAM noted an average high rate of infection, ranging in 1918 from 14·24 per cent. of British troops up to 27·9 per cent. of Indian troops employed in that area. In Salonika, Egypt and Palestine, amoebiasis was always present, though at no time did it rage in epidemic form. This disease constituted from 5 to 10 per cent. of all the clinical dysenteries evacuated to hospitals. The "carrier" rate in British soldiers and in the native population was found to vary considerably in different war zones and will be considered subsequently.

An important point bearing upon the epidemiology of amoebiasis has been the discovery of the *Entamoeba histolytica* as a natural infection amongst animals. EICHORN and GALLAGHER (1916) in America have recorded an outbreak of spontaneous dysentery amongst captive spider monkeys (*Ateles ater*), two of which developed hepatic abscess; DOBELI considers that the cysts of entamoeba in the faeces of *Macacus rhesus* are indistinguishable from those of *E. histolytica*, so that it is by no means impossible that monkeys may constitute a reservoir of infection.

The dog, like the cat, is susceptible to laboratory infection with *E. histolytica*; but amoebiasis probably does occur amongst them under natural conditions. WARE has recorded an outbreak amongst fox hounds in India, FISCHER a case of intestinal ulceration in a dog in China in which entamoebae were demonstrated; BAUCHE and MOTAIS a similar case in a dog recently imported from Cochin.*

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† References are to summaries in the *Tropical Diseases Bulletin* unless otherwise stated.

2. Etiology.

DOBELL has published the most accurate description of *Entamoeba histolytica* and its life-history which has yet appeared, in his great work, "The Amoebae Living in Man" (1919). Its active forms vary greatly in size, ranging from 18μ to about 40μ . When at rest it assumes a spherical form, the protoplasm consisting of two well-marked layers—an outer clear, structureless ectoplasm, and an inner finely and uniformly granular endoplasm. Ingested red blood corpuscles in various stages of disintegration are often seen, but *bacteria and other inclusions* are not present in healthy specimens; vacuoles, resembling bubbles, indicate that the individual entamoeba is degenerate. The nucleus is not distinct in a perfectly healthy entamoeba, but in the earlier stages of degeneration it becomes visible; it is situated in the endoplasm, measures $4-7\mu$ in diameter, possesses a small central karyosome, and is eccentrically placed.

The nuclear characters of *E. histolytica* (Fig. 1)—according to DOBELL, a uniform layer of small chromatin granules at the periphery, the central karyosome with its halo and the absence of chromatin in the intervening space—serve to distinguish *E. histolytica* from all other intestinal species of the genus *Entamoeba*.

The life-history of *E. histolytica* in man appears to be as follows:—The active entamoebae live in the gut wall, where they multiply by division; subsequently a certain proportion migrate from the ulcerated surface into the lumen of the bowel and encyst, passing out ultimately with the faeces. Encystation occurs only in the bowel, for DOBELL has shown that precystic amoebae after being passed out in the stools are unable to complete their development.

The precystic amoeba, which is smaller than the parent forms, comes to rest, becomes rounded and secretes a cyst wall. The cysts are smaller than the precystic forms. Primarily uninucleate, they subsequently become, when fully mature, quadrinucleate. They vary greatly in size; DOBELL and JEPPI have described five races of *E. histolytica* distinguishable by the size of the cysts, the respective mean diameters being 6.6μ , 8.3μ , 11.6μ , 13.3μ and 15μ . It is probable that the smaller races of cysts have been long overlooked.

The encysted organism forms in its cytoplasm blocks of a highly refractile substance giving all the reactions of chromatin—termed *chromatoid bodies* by DOBELL; at the same time a vacuole of varying size forms in the cytoplasm. An iodophilic substance, probably glycogen, is generally present in the vacuole. When the cyst has reached the quadrinucleate stage no further nuclear divisions occur; the glycogen vacuole disappears and the mature cyst stains uniformly pale brown with iodine solution.

The cysts of *E. histolytica* survive for several weeks outside the body, if kept moist and cool. Some remain alive much longer than others, and as they die they become permeable to aqueous stains such as eosin.

DOBELL considers that *E. histolytica* may sometimes form supernucleate cysts of eight nuclei, but that this happens very rarely.

When the cysts are swallowed by man they probably hatch in the small intestine, liberating small amoebae, which pass into the large bowel. The exact manner of excystation is still a matter of dispute. CHATTON has found that the cysts, when swallowed by a cat, pass through its stomach without undergoing any marked change and, according to his observations, normally hatch in the small intestine, liberating young quadrinucleate amoebae which first live on bacteria,

but subsequently establish themselves in the tissues of the large gut. PENFOLD, WOODCOCK and DREW have claimed that they were able to hatch cysts by placing them in liquor pancreaticus. They observed but a single small amoeba emerge through a small aperture in each cyst. These experiments were subsequently repeated without success by DOBELL and A. C. STEVENSON, so that the matter can by no means as yet be considered settled.

Normally no other stages than those described above occur in the life-history, but exceptionally the entamoebae may migrate from their primary site of infection via the portal vein into the liver or brain, where they may give rise to abscesses. The organisms in these secondary infections are always typical tissue-inhabiting forms, pre-cystic individuals and cysts being found in the intestinal contents only.

Cultivation of *E. histolytica* on artificial media has not yet been unquestionably successful. CUTLER claims to have obtained cultures of pathogenic amoebae on six occasions out of forty-five attempts in an egg-broth and a blood-clot medium; sub-cultures had to be made daily. This work has been repeated with unsuccessful results by DOBELL and DOUGLAS and as yet has not been confirmed by other workers.

Four other species of intestinal amoebae are now recognized as parasitic in the alimentary tract of man, and it is necessary to mention them, as their differentiation has been accurately determined only during the period under review.

Entamoeba coli (Fig. 2) is a harmless commensal living in and feeding upon the contents of the large intestine, but never invading the tissues of its host. It is a large species, though subject to great variation in size. Its mean diameter is from 20 to 23 μ , the extremes from 18 to 40 μ . There is no marked differentiation of the protoplasm as in *E. histolytica*, and the granular cytoplasm generally contains food vacuoles and ingested bacteria, but never red blood-corpuscles or other tissue elements. The cysts exhibit considerable variation in size (between 10 and 30 μ), and it is generally agreed that *E. coli* is a composite species consisting of a number of races. The immature cyst is uninucleate, the fully mature cyst octonucleate. Chromatoid bodies, though present in young cysts, usually disappear when they are fully mature.

Endolimax nana (Fig. 3) is a small non-pathogenic amoeba 6 to 12 μ in diameter, possessing a characteristic vesicular nucleus and a large irregular eccentric karyosome. It probably inhabits the small intestine and lives upon its contents. The cysts are oval bodies having characteristic features, and are about the same size as are the active forms. When mature they contain four nuclei and a few refractile granules, no chromatoid bodies, and a considerable amount of glycogen.

Iodamoeba bütschlii (Fig. 4) is a small amoeba intermediate in size between the two former species and measuring 9 to 20 μ in diameter. The cytoplasm contains food vacuoles, bacteria and other food particles. The nucleus is vesicular, with a moderate-sized central karyosome. This amoeba feeds mostly upon the micro-organisms of the large intestine. The cysts are uninucleated structures, frequently irregular in shape, and measure 9 to 12 μ in diameter. They are conspicuous mainly by the large dense glycogen mass they contain, which stains intensely with iodine. The nucleus of the cyst is eccentrically placed and contains a conspicuous compact karyosome.

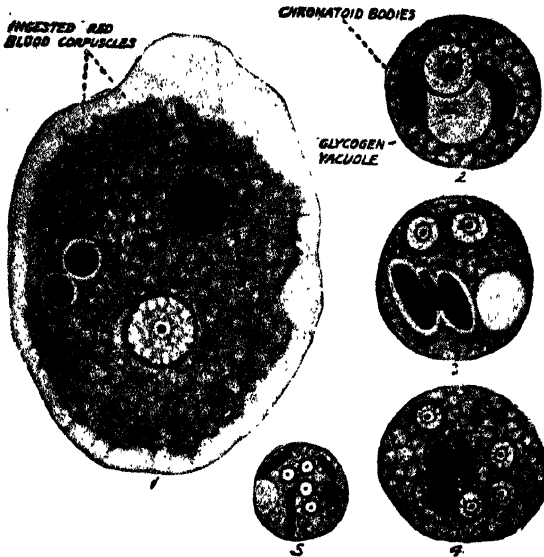


Fig. 1. *Entamoeba histolytica*. $\times 2,500$ diameters. (After DOBELL.)
1, Active amoeboid form with ingested red blood-corpuscles; 2, Uninucleate cyst; 3, Binucleate cyst; 4, Quadrinucleate cyst; 5, Quadrinucleate cyst, small race, 6.6μ in diameter.

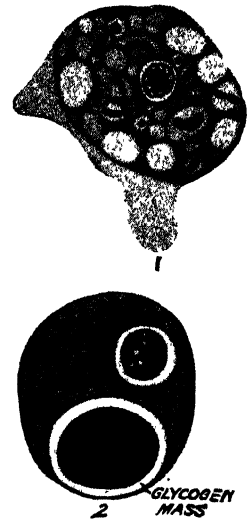


Fig. 4. *Iodamoeba butschlii*. $\times 2,500$ diam. (After DOBELL.)
1, Active amoeboid form with ingested micro-organisms; 2, Mature cyst, "iodine cyst," containing large glycogen mass.

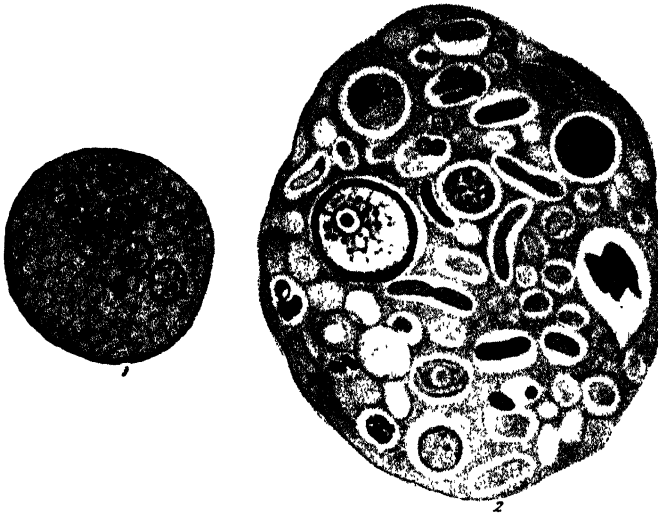


Fig. 2. *Entamoeba coli*. $\times 2,500$ diameters. (After DOBELL.)
1, Cyst with eight nuclei; 2, Active amoeboid stage, with ingested food material.

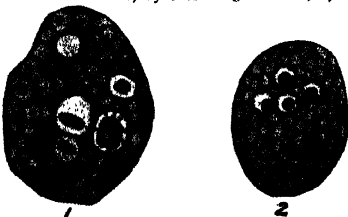


Fig. 3. *Endolimax nana*. $\times 2,500$ diam. (After DOBELL.) 1, Active amoeboid form; 2, Quadrinucleate mature cyst.



Fig. 5. *Dietsamoeba fragilis*, uninucleate and binucleate forms. $\times 2,500$ diam. (After DOBELL.)

The Intestinal Amoebae of Man.

[Reproduced by permission from "MANSON'S TROPICAL DISEASES."]

Dientamoeba fragilis (Fig. 5) is a very small and rare amoeba of the large intestine. Its usual diameter is about 9μ . Binucleate individuals are frequently encountered. The nucleus is large, spherical and vesicular, the karyosome being large and composed of numerous granules. The organism lives exclusively upon bacteria; no cysts have as yet been found.*

3. Pathology.

Entamoeba histolytica penetrates the tissues by destroying the cells; probably, as DOBELL suggests, it does not force its way into the tissues, but secretes a powerful cytolytic ferment which dissolves them, so that these organisms come to lie in pools of broken down tissue which they absorb as nutriment. In the base of the ulcer they also ingest red blood corpuscles and cell-fragments, but by no means to the same degree as they do when free in the bowel contents. LYNCH believes that the entamoebae gain entrance to the deeper tissues through the glands of Lieberkühn, and in the earlier stages of penetration form a nest at the base of a crypt; thence they invade the submucosa. The port of entry once having been established, they migrate for a considerable radius in all directions, causing thrombosis of the blood vessels of the submucosa and muscularis with consequent necrosis of the superjacent tissues and the formation of a typical ulcer. According to JOB and HIRTZMANN secondary bacterial infection of the ulcers invariably takes place.

BARTLETT has given a very good description of the morbid anatomy and histology of amoebic ulceration of the large intestine, with typical "flask-shaped" ulcers as he terms them.

MANSON-BAHR considers that amoebic ulcers may be differentiated by their gross characteristics from those caused by a chronic bacillary infection by the following features:—Amoebic ulcers commence usually in the solitary lymphoid follicles and run parallel to the long axis of the gut; they are discrete, oval in outline, flask-shaped in section, involving mucous membrane, submucosa and muscular coats of the intestine. They are distributed throughout the large intestine from the caecum to rectum, being usually larger and more extensive in the lower part; the small intestine is never affected. The mucous membrane between the ulcers appears unaffected.

Chronic bacillary ulcers, on the other hand, appear to commence on the free folds of mucous membrane and to be distributed transversely to the long axis of the gut; in outline they are serpiginous, with ragged undermined edges often intercommunicating with neighbouring ulcers, and involving mucous membrane as well as muscularis mucosae. They are found in the last two feet of the ileum as well as in the large gut. The intervening mucous membrane is inflamed and presents an unhealthy plush-like appearance.†

* REFERENCES.

SELLARDS (A. W.) & BAETJER (W. A.), vol. 5, p. 204; PENFOLD (W. J.), WOODCOCK (H. M.) & DREW (A. H.), vol. 8, p. 116; WENYON (C. M.) & O'CONNOR (F. W.), vol. 11, p. 43; CHATTON (E.), vol. 11, p. 251; DOBELL (C.) & JEPPE (M. W.), vol. 12, p. 4; CUTLER (D. W.), vol. 12, p. 292; DOBELL (C.), "The Amoebae Living in Man," 1919, John Bale, Sons & Danielsson, Ltd.

† REFERENCES.

JOB (E.) & HIRTZMANN (L.), vol. 9, p. 176; BARTLETT (G. B.), vol. 10, p. 146; MANSON-BAHR (P. H.), vol. 14, p. 320; LYNCH (K. M.), vol. 17, p. 6.

4. Symptomatology.

CANNATA has drawn attention to the occurrence of amoebic dysentery in children of tender years in places where the disease is endemic. Cases are recorded in children between 2 and 15 years of age.

DOBELL and STEVENSON have given accounts of cases in which infection with *E. histolytica* appears to have been prolonged; the infection may persist certainly for 16, it may be for 34 years. The capacity for latency which this infection may exhibit has certainly struck most observers. Relapses have occurred in individuals who have for five or even six years remained free from all evidence of the disease. We know from the investigations of WENYON and O'CONNOR and the Liverpool workers that the majority of the excretors of *E. histolytica* cysts give no history of intestinal disturbance, and that, in fact, the percentage of post-dysenteric cyst-passers is about equal to that of those with no previous dysenteric record. It may be, as DOBELL suggests, that not more than 10 per cent. of persons who become infected with *E. histolytica* ever suffer to any appreciable extent from their infections.

It has come to be recognized that a large proportion of recurrent diarrhoeas are amoebic in origin, and to this condition, in which true dysenteric symptoms may never appear, the name "amoebic diarrhoea" should be applied.

Hepatic and Brain Abscess.—STOUT and FENWICK record the association of liver abscess with a similar accumulation of pus in a cavity "the size of a pigeon's egg" in the brain; active *E. histolytica* were present.

ARMITAGE has described a similar case in which the organisms were numerous. He has collected evidence of 48 cases altogether from the literature: only three have been in women.

Several papers have appeared on the subject of liver abscess adding little to existing knowledge.

TALBOT has summarized the signs and symptoms as follows:—

- (1) General enlargement of the liver.
- (2) Pyrexia, either continuous or remittent.
- (3) Leucocytosis of 18,000.
- (4) A local tender spot over the liver.
- (5) Signs of irritation at base of right lung.
- (6) Rapid wasting.
- (7) Heavy nocturnal sweats.

Symptoms of less value are:—Local bulging, pallor, rigors, referred pain in right shoulder, rigidity of right rectus.*

5. Diagnosis.

In the acute stage of the disease LEDINGHAM has pointed out that fully 90 per cent. of untreated amoebic dysenteries may be correctly diagnosed by a single microscopical stool examination. The amoebae may be recognized as highly refractile organisms often

* REFERENCES.

Symptomatology.—CANNATA (S.), vol. 8, p. 437; DOBELL (C.), vol. 9, p. 178; SMITH (A. M.) & MATTHEWS (J. R.), vol. 11, p. 47; DOBELL (C.) & STEVENSON (A. C.), vol. 12, p. 3; BRUG (S. L.), vol. 18, p. 34.

Hepatic and Brain Abscess.—STOUT (T. D. M.) & FENWICK (D. E.), vol. 12, p. 290; ARMITAGE (F. L.), vol. 14, p. 93; GIBSON (C.), vol. 14, p. 316; TALBOT (P.), vol. 15, p. 191; CANDLER (A. L.), vol. 16, p. 2; LUDLOW (A. I.), vol. 17, p. 8.

showing active movements and emitting with explosive suddenness pseudopodia as lobes of clear ectoplasm. Under favourable conditions they show a rapid, progressive flowing movement. The most important characters for identification of *E. histolytica* in unstained preparations are these active explosive movements and the frequent presence of ingested red blood corpuscles and absence of other inclusions; in fact, as WENYON has pointed out, the presence of ingested erythrocytes in a motile amoeba is diagnostic. As the active entamoebae rapidly die and disintegrate after leaving the intestine, it is essential that the examination should be made soon after passage of the stool, within two hours if possible. It is also important that the bed-pan or other utensil should be free from antiseptics and dry, as even water or urine rapidly kills these organisms.

The *macroscopic appearance* of an amoebic dysentery stool during the acute stage affords a probable diagnosis. In brief, the characteristic evacuation consists of blood and mucus closely intermingled with fluid offensive faeces, the blood occurring in streaks or clots, whereas in bacillary dysentery the stool consists of viscid, odourless, blood-stained mucus.

WILLMORE and SHEARMAN have pointed out that the cellular exudate of the "amoebic stool" has diagnostic characters that warrant a further extended search for the typical entamoebae in cases in which they were not found on the first examination. These may be summed up as follows:—

Scantiness of the cells, especially polymorphonuclears; preponderance of mononuclears over polymorphonuclears. Evidence of proteolytic digestion of the cells; absence of all phenomena characteristic of inflammatory reaction.

The microscopic diagnosis in the chronic or latent stage of amoebiasis is by no means so easily made. The appearance of the cysts in the faeces is so precarious that should but a single specimen of the faeces be examined a very considerable number of infections will be missed. This is especially true of the so-called cyst-carriers. DOBELL has recorded an instance in which a diagnosis was made on the thirty-fifth consecutive examination, and it is probably necessary as a routine that at least six stool examinations should be made. The position may be put this way:—Should a series of cases be examined once apiece, about one-third of the infections actually present may be disclosed. In a series thrice examined, between one half and two-thirds of the actual number of infections will have been detected.

The limitations of simple microscopic diagnosis have suggested methods of concentrating entamoebic cysts in stools as elaborated by CROPPER and ROW. The maximum concentration of cysts for diagnosis is obtained as follows:—Faeces and saline in the proportion of 1 gm. of faeces to 30 cc. saline are shaken on a shaking machine for a minimum of half an hour. The emulsion is then poured into a separating funnel and shaken up by hand for half a minute with 10 to 20 per cent. of its volume of ether and allowed to stand for a minute or two. The faecal matter absorbs the ether and rises to the top of the saline, while the cysts remain beneath; by this method a fifteen-fold cyst concentration is effected.

The identification of cysts is best effected by the addition of iodine solution to the stool; this brings out their salient diagnostic features. The solution is made by saturating a 1 per cent. watery solution of

potassium iodide with iodine, which acts partly as a fixative, partly as a stain. For still more accurate differentiation of cysts the following staining method is recommended by DOBELL. The specimen should be prepared and fixed as soon after the passage of the stool as is possible. The preparation should never be allowed to dry.

The following special reagents are required :—

1. *Fixative*.—Saturated aqueous solution of mercury perchloride, 2 parts ; absolute or 96 per cent. alcohol, 1 part. When mixed together 5 cc. glacial acetic acid should be added to each 100 cc.

2. *Stain*.—Haemalum solution, prepared as follows : one gm. of haematoxylin is dissolved in 1 litre of water ; then 0.2 gm. of sodium iodate (NaIO_3) and 50 gm. of alum (potash) are added. When these salts are dissolved the stain is filtered. This stain has the advantages that it is easy of preparation, does not require to be kept before use, and is not liable to over-stain.

Fixation.—In preparing the specimen a small portion should be spread with a platinum loop on a cover-slip. As soon as the material is spread the cover-slip is floated film-side downwards on the fixative. Fixation is complete in 10–20 minutes.

Washing process.—The specimens must be now thoroughly washed, first in 50 per cent. or 70 per cent. alcohol, after which they are placed in 70 per cent. alcohol to which a few drops of iodine solution have been added. In this they are allowed to remain for 30 minutes, and are then placed in weaker alcohol for a few minutes before being transferred to distilled water.

Staining.—This is carried out by placing the cover-slips in the haemalum solution for 10 to 20 minutes. If over-staining occurs they may be decolorized in acid alcohol or weak alum solution. After staining the specimens are washed in tap-water until blue.

Dehydration, etc., is preferably carried out in stages—the specimens being placed first in 35 per cent., then in 70 per cent., and lastly in absolute alcohol ; from this they are transferred to a mixture of equal parts of absolute alcohol and xylol, then to pure xylol, and are then mounted in balsam. The greatest care must be taken that the specimen is never allowed to dry.

The association of Charcot-Leyden crystals with long-standing intestinal amoebiasis has been noted by ACTON, and more recently by THOMSON and ROBERTSON, who consider their presence in the stool as suggestive, if not diagnostic. These crystals are found also in scrapings of the ulcers, but their source is not clear ; they may be due to specific action on the part of the *Entamoeba histolytica*, as they are never found in dysenteries of bacillary origin.

In view of the fallacies and shortcomings of microscopic diagnosis MANSON-BAHR and GREGG advocate the routine use of the sigmoidoscope ; by this means the entamoebae may be demonstrated in scrapings of the ulcers obtained through the instrument. The characteristic appearances are oval or diamond-shaped ulcers varying greatly in size and having haemorrhagic margins and grey or greenish sloughs. Flame-shaped haemorrhages may also be visible, often partly concealed in folds of puckered mucous membrane.

REINHARD has claimed assistance in diagnosis from the employment of X-rays. The substance used is barium sulphate. Insufficiency and stenosis at the ileo-caecal valve and flexures may be thereby revealed and are said to be characteristic.

As regards the diagnosis of hepatic abscess CANDLER has recorded that X-rays do not always aid, should the abscess occur in the centre of the liver. Leucocytosis may be uncertain, as low as 4,700 and as

high as 28,000. GIBSON observes that a history of previous diarrhoea or dysentery is by no means conclusive; pain is necessarily present in every case of unilobar abscess owing to distension of the liver.*

6. Treatment.

Growing disbelief in the efficacy of hypodermic injections of emetine hydrochloride to effect a radical cure of amoebic dysentery is manifest in all the more important recent literature. WENYON and O'CONNOR, in Egypt, concluded that it was necessary to administer larger doses than had hitherto been considered judicious in order to effect a cure. They injected 1 gr. a day hypodermically, together with $\frac{1}{2}$ gr. in keratin-coated tabloids by the mouth for 12 days, totalling 18 gr. This method was more efficacious in chronic carrier cases than in the acute stage of the disease. A further deterrent to the extended use of emetine is the fact that in excessive doses its toxic effect is distinctly cumulative. DALE produced definite poisonous effects in experimental animals, while KILGORE has described a peripheral neuritis after emetine treatment. BALFOUR and PYMAN have drawn attention to the fact that emetine may itself produce and keep up a certain degree of diarrhoea, and it is important to distinguish this drug-produced diarrhoea from that caused by intestinal disease.

Emetine bismuthous iodide in the treatment of amoebic dysentery was introduced by DUMEZ, and was quickly taken up by DALE, who suggested an average daily dose by the mouth of 3 gr. in capsules (representing 1 gr. of emetine hydrochloride), given on 12 consecutive nights—a total of 36 grains. The drug is a red powder insoluble in dilute acid, which, passing through the stomach unchanged, becomes gradually decomposed, with the liberation of emetine and precipitation of bismuth sulphide in the intestine.

It has been shown by Low that the drug passes through the intestine unabsorbed if compressed into a hard tablet, or if coated with insoluble substances such as paraffin, vaseline, resin, keratin, or stearin. It is best made up in powder form in hard gelatin cachets. Vomiting and nausea may be prevented by 10–15 minims of tincture of opium given half an hour beforehand. Slight purging is the rule and should be regarded as a favourable symptom. During the course the patient must remain in bed and partake of a light fluid diet, preferably milk.

In chronic cases and cyst passers GUNN and SAVAGE and LILLIE and SHEPHEARD have reported that emetine bismuth iodide has given by far the most satisfactory results. Unfortunately it is now recognized that although 70–80 per cent. are cured by one course as described above, yet there remains a residue who are refractory. In these cases

* REFERENCES.

- Diagnosis.*—NOC (F.), vol. 8, p. 112; WILLMORE (J. G.) & SHEARMAN (C. H.), vol. 12, p. 311; COPE (Z.), vol. 17, p. 35.
By X-rays.—REINHARD (P.), vol. 9, p. 177.
Detection of Cysts.—CROPPER (J. W.) & ROW (R. W. H.), vol. 9, p. 421; CARTER (H. F.) & MATTHEWS (J. R.), vol. 11, p. 46.
By Charcot-Leyden crystals.—ACTON (H. W.), vol. 14, p. 96; THOMSON (J. G.) & ROBERTSON (A.). *Proc. Roy. Soc. Med.* 1921, vol. 14, pp. 33–44.
By Sigmoidoscope.—MANSON-BAHR (P. H.) & GREGG (A. L.), vol. 18, p. 35.
Diagnosis of Hepatic Abscess.—GIBSON (C.), vol. 14, p. 316; CANDLER (A. L.), vol. 16, p. 2.

72 and even 200 gr. of EBI have been given altogether. If well tolerated it may be possible by splitting up the dose to give 4 or even 5 gr. a day.

NOC and others consider that emetine is rendered more efficacious by the intravenous injection of neosalvarsan, possibly by the tonic action of this drug. RAVAUT and KROLUNITZKI have given novarsenobenzol in capsules, each containing 0.05 gm., daily by the mouth for 10 days in chronic cases and cyst passers.

CALAME has reported rectal injections of neosalvarsan in doses ranging from 0.45 gm. in 200 cc. to 0.9 gm. in 1000 cc., and considers this method worthy of a further trial.

NIXON, SELLARDS and McIVER, SHEPHEARD and LILLIE report favourably on treatment with "chaparro amargosa." This is a decoction made from the powdered roots, branches and foliage of a plant (*Castela Nicholsoni*) which is indigenous to Texas and north Mexico. Chaparro is closely allied to simaruba. Treatment should last ten days. Five teaspoonfuls of the powdered drug are used each day—three for oral and two for rectal use. The drink is prepared by boiling for a quarter of an hour one teaspoonful of powdered chaparro in 8 oz. of water; it is then allowed to cool and is strained. It is administered half an hour before breakfast, dinner and supper. The enemata, prepared in the same way as the drink, save that 12 oz. of water are used, are given one in the morning about 10 a.m., the other in the evening at 6 p.m. The patient should remain in the elbow-knee position for at least 15 minutes after the enema and should retain it as long as possible.

DARGEIN has advocated rectal lavage with infusions of ipecacuanha root, 10 gm. to 500 cc. of water

HAUGHWOUT in China has obtained "surprisingly good results" with benzyl benzoate in 20 per cent. alcoholic solution, twenty drops being given three times a day.

WALKER and EMRICH have tried oil of chenopodium in 16 minim doses in cachets (given on three occasions at two-hourly intervals—making 48 minims in all) in cyst passers with good results; but on account of its poisonous action, chenopodium is not generally recommended.

NIKLAS states that appendicostomy with lavage has not proved to be a satisfactory method in chronic amoebic cases.

Emetine injections have proved to be a necessary adjuvant in the treatment of hepatic abscess. DOPTER states that there is no evidence that this drug assists in the absorption of liver pus—evacuation is absolutely necessary; washing out the abscess cavity with a solution containing emetine is not recommended. Should the stools contain *E. histolytica* cysts a course of emetine bismuth iodide should be prescribed.*

* REFERENCES.

Treatment by Emetine.—DALE (H. H.), vol. 7, p. 237; BALFOUR (A.) & PYMAN (F. L.), vol. 8, p. 219; KILGORE (A. R.), vol. 8, p. 442; JEPPI (M. W.), vol. 9, p. 179; WENYON (C. M.) & O'CONNOR (F. W.), vol. 11, p. 43.

Emetine Bismuthous Iodide.—DUMEZ (A. G.), vol. 6, p. 446; DALE (H. H.), vol. 8, p. 441 & vol. 10, p. 129; LOW (G. C.) & DOBELL (C.), vol. 8, p. 441; DOBELL (C.), vol. 9, p. 178; DALE (H. H.) & DOBELL (C.), vol. 11, p. 248; SAVAGE (R. E.) & YOUNG (J. R.), vol. 11, p. 49; GUNN (J. W. C.) & SAVAGE (R. E.), vol. 15, p. 187.

7. *Prophylaxis.*

Efficient prophylaxis of amoebiasis depends upon an exact knowledge of the manner in which the infection is spread. Unfortunately this cannot be said to be satisfactorily established. It is generally believed that the infection is carried mainly by polluted water, though this belief cannot be said to rest upon any exact foundation. The danger of house-flies acting as carriers of infection has been emphasized by WENYON and O'CONNOR in Egypt and by BUXTON in Mesopotamia. The former observers have proved that the cysts of *E. histolytica* can be found in the fly's intestine so long as any faecal matter remains there. Should the flies be prevented from feeding, this interval may be as long as forty-two hours. The direct passage of practically unaltered material through the gut of the fly would seem to be of more importance in the distribution of the disease generally than the regurgitation of such material through the proboscis or its adherence to the legs or bodies of the insects.

The existence of large numbers of excretors of *E. histolytica* cysts has naturally a considerable bearing upon the prophylaxis of the disease. Carriers of entamoebae have been divided into two classes—generally termed *contact carriers* and *convalescent carriers*. The former are individuals who have never suffered from amoebic dysentery, and the latter those who have recovered clinically from dysentery without losing their infection. Highly infected individuals showing no clinical signs of infection and passing faeces which are infective to others probably greatly outnumber those who suffer from dysentery. Viewed in this light the occurrence of dysentery is an accident and is as much against the interests of the parasite as it is deleterious to the tissues of the host. According to DOBELL, *E. histolytica*, whether it causes recognizable dysenteric symptoms or not, must always live at the expense of its host's tissues. The ulceration may be superficial or even microscopic.

CAMPBELL, in Alexandria, performed autopsies on cases well known to be carriers without being able to find any naked-eye lesions, and we know also from the work of BARTLETT that amoebic ulceration of the intestine may exist without producing dysenteric symptoms during life.

In order, then, effectively to protect a community from amoebiasis it would be necessary to detect and isolate all healthy carriers of infection. This manifestly cannot be done. The longer European troops

Treatment of Carriers by Emetine Bismuthous Iodide.—WADDELL (W.), BANKS (C.), WATSON (H.) & KING (W. O. R.), vol. 11, p. 50; LILLIE (D. G.) & SHEPHEARD (S.), vol. 11, p. 50.

Alcresta Ipecacuanha.—ALLAN (W.), vol. 8, p. 113.

Salvarsan.—NOC (F.), vol. 8, p. 113; RAVAUT (P.) & KROLUNITZKI (G.), vol. 8, p. 442; CALAME (P.), vol. 12, p. 8.

Oil of Chenopodium.—WALKER (E. L.) & EMRICH (W.), vol. 11, p. 51.

Benzyl Benzoate.—HAUGHWOUT (F. G.) & LANTIN (P. T.), vol. 15, p. 190; HAUGHWOUT (F. G.), vol. 17, p. 37.

Chaparro Amargosa.—NIXON (P. I.), vol. 6, p. 51, and vol. 8, p. 114; SHEPHEARD (S.) & LILLIE (D. G.), vol. 12, p. 7; SELLARDS (A. W.) & McIVER (M. A.), vol. 13, p. 225.

Ipecacuanha Enemata.—DARGEIN (G.), vol. 17, p. 163.

Surgical Treatment.—NIKLAS (F.), vol. 17, p. 36.

Treatment of Hepatic Abscess.—DOPTER (Ch.), vol. 8, p. 114; GAGLIO (E.), vol. 17, p. 166.

remained in the endemic areas of amoebiasis, the higher the percentage of healthy excretors became. After a year's residence in Egypt WENYON and O'CONNOR found that the percentage of carriers amongst the troops was about 5·3 per cent., whilst it was much higher—13·7 per cent.—amongst native Egyptians. At the end of the Mesopotamian campaign MACADAM, on examining the British troops returning to India, estimated that no less than 33 per cent. were carriers of *E. histolytica*.

WENYON and O'CONNOR, in considering this problem, remarked that, even if the organization for the examination of very large numbers of troops existed, it would be unjustifiable to detain large numbers of healthy men, for supposing that all carriers amongst the troops were separated and treated, there yet remains a source of infection in the shape of the native of the country and the house-fly, against which scientific armature is at present helpless.

The prophylaxis of amoebiasis, as in the case of other familiar intestinal diseases, may be said to rest upon an efficient general sanitation.*

* REFERENCES.

Carriage by Flies.—WENYON (C. M.) & O'CONNOR (F. W.), vol. 10, p. 126 ; BUXTON (P. A.), vol. 16, p. 1.

Cyst passers.—MACADAM (W.) & KEELAN (R.), vol. 16, p. 2 ; MACADAM (W.), vol. 17, p. 1 ; LEDINGHAM (J. C. G.), vol. 17, p. 31.

MALARIA.

- i. CHRISTOPHERS (S. R.) & SHORTT (H. E.). **Malaria in Mesopotamia.**—*Indian Jl. Med. Res.* 1921. Jan. Vol. 8. No. 3. pp. 508–552. With 4 maps, 1 chart and 2 plates.
- ii. — & —. **Incidence of Malaria among Troops in Mesopotamia, 1916–1919.**—*Ibid.* pp. 553–570. With 1 chart.

These papers form a valuable contribution to our knowledge of malaria as it affects the Mesopotamian plain and submontane regions, and the montane regions of Persia between the 30th [not 35th] and 37th parallels. The level alluvial riverine plain, sterile apart from irrigation, passes westward into the practically waterless, undulating, stony or sandy desert, and eastwards into submontane and mountainous country. Irrigation is (i) as in the Punjab, by high-level canals, with attendant risk of spilling and waterlogging; (ii) by uplift, in which case water is expensive and but little is allowed to run to waste; (iii) by inundation in the lower reaches where, as the result of alluvial deposit, the river banks overtop the surrounding country, and where, by merely breaching these, water may be obtained in unlimited quantity; with the result that such overflow runs freely on to the land, whose subsoil water is thereby raised in surface level, a fact having a most essential effect on prophylaxis about Basra; (iv) “palm grove irrigation” in the Shat-el-Arab, consisting of a series of branching creeks bringing tidal but fresh water within a few feet of every part of a belt three to seven miles wide.

The Anopheles of this region are:—(1) *A. pulcherrimus*, very common and almost ubiquitous in the plains from March to November, a strong flier, marsh breeder, voracious, mainly a night feeder, bold and unretiring, rarely, if ever, associated with marked malarial prevalence, but proved capable of acting as host. Its area of distribution in Mesopotamia is eastwards from the Syrian desert along the Tigris plain. It reaches India by the Oxus and Indus plains.

(2) *A. superpictus*, a breeder, in Mesopotamia, in submontane river pools and running water and in irrigation channels, retiring, always associated with a high malarial incidence, a proved host of malarial parasites, ranging from Abbottabad and Quetta to Salonica, Greece, Southern Italy and Algeria.

(3) *A. maculipennis*, the chief European malaria carrier, has in Mesopotamia a distribution corresponding to that of *A. superpictus*, and breeds there during the cold weather (the larva and pupa surviving freezing) in irrigation channels and irrigation leaks. It has no evident association with malaria.

(4) *A. sinensis* is an undomesticated cold-weather breeder in swamps and irrigation channels, probably with little relationship to malaria in Mesopotamia.

Other species occasionally found there are *A. algeriensis*, *A. bifurcatus* and *A. rhodesiensis*.

As indicated by the spleen rate in 7,981 children, there is moderate malarial endemicity about the Shat-el-Arab (spleen rate 12) and in the lower Tigris and Euphrates (28); an area of slight endemicity in the upper Tigris and Euphrates (3·9), extending into the Dyala submontane; hyperendemicity in the Zab (66) and Mosul (77) submontanes, and a hyperendemic focus at Kerbala (81); while the Persian plateau and Bagdad and Mosul cities are free from infection.

That infection and admission to hospital were not synonymous among the 400,000 troops attached to the Mesopotamian Force is shown by the fact that blood examinations of 3,500 men doing active duty with their units gave a percentage of infection for British troops of 1 and for Indian troops of 2·7. This implies that on any one day 1,000 British and over 8,000 Indians were infected, while only 27 and 31 respectively sought admission to hospital, an important aspect of the subject requiring further elucidation. Quartan malaria caused not more than 1 per cent. of the cases; the others were predominantly benign tertian, though less markedly so in the northern areas.

Clayton Lane.

WENYON (C. M.), ANDERSON (A. G.), McLAY (K.), HELE (T. S.) & WATERSTON (J.). **Malaria in Macedonia, 1915-1919. Part I. The Incidence and Aetiology of Malaria in Macedonia** [by WENYON (C. M.)].—*Jl. Roy. Army Med. Corps.* 1921. Aug. Vol. 37. No. 2. pp. 81-108. [First instalment.] With 1 map, 1 chart and 9 illustrations.

British troops occupied nearly 2,000 square miles of Macedonia, the district consisting of a fringe of valley area haunted by *Anopheles maculipennis*, and a hilly centre swarming with *A. superpictus*, the whole, however, being highly malarious. Time, men and money were none of them available to rid this large area of mosquitoes. An enormous amount of anti-mosquito work was indeed done, but its magnitude necessitated its limitation within a circumference of half a mile from camps. Since local evidence became forthcoming that the range of flight of mosquitoes was not a quarter of a mile, as had been supposed, but one, two, or indeed anything up to ten miles with a favouring wind, the extent of this work, great though it was, proved quite ineffective in making any appreciable diminution either in the numbers of mosquitoes or in the incidence of malaria. As is aptly said, "When the number of mosquitoes attacking an individual amounts to hundreds, if not thousands, the reduction of these by a small proportion will hardly lessen a man's chance of infection. It matters little whether he is bitten by ten or only by five infected mosquitoes in a single night."

Quinine prophylaxis in Macedonia proved most disappointing. Wenyon's view on the subject is this. If one may assume that, as in trypanosomiasis, there are certain individual parasites insusceptible to the curative drug, so in malaria there are certain sporozoites, or young forms arising immediately from them, which are resistant to quinine, it will follow that "if an individual is being bitten by only a small number of infected mosquitoes the chances of his acquiring malaria will be very much diminished if he has quinine in his system, for it will be only very rarely that resistant sporozoites will be injected. If, however, he is being constantly bitten, he will most certainly be infected, for among the large number of sporozoites injected there will be some resistant forms." That the percentage of infected mosquitoes must have been great was shown by the finding of 25 per cent. of carriers in about 3,000 men who had suffered clinically, and by the fact that anything up to 70 per cent. of the mosquitoes found in tents in the morning had fed during the night. Mosquito nets used were of two types: a bivouac net taking two men, and a bell net fixed to a hoop

hung over the head of each person. The disadvantage of the former was that it had to cover two men, of the latter that it was difficult to keep adjusted, of both that they were stores issued locally after men reached a camp, and that there was frequently a delay of one, sometimes of two, nights before such issue was made to newly arriving units. It is suggested that the issue to rest camps of single rectangular nets, with a calico base, in numbers in excess of strength to allow for repairs, and arranged on cords in parallel rows, will afford the best protection. Screened huts proved valuable, as did minor devices such as turn-down shorts to protect the knees, sprayers, swats, traps, and repellents, the last useless half an hour after application. The conclusion reached is that in this highly malarious country, had the money and energy expended in antilarval measures and in quininization been concentrated on the protection of man against actual bites, malaria would probably have been lessened.

Wenyon next considers the published reports of malaria in the French zone, lying immediately to the west of that held by the British. Although mosquito netting, mosquito proofing and antilarval measures were carried out on a less lavish scale than by the British, and although the latter had more malaria in 1917 than in 1916, it is claimed that for every 60 cases of primary malaria in 1916 the French had only 7 in 1917. On analysing available figures it appears, however, that in 1916 they had 31,727 admissions to hospitals for malaria. Of these, 17,614 were evacuated to France and 13,446 left in Macedonia. Yet in 1917, 31,000 cases of secondary malaria were admitted to hospital. Presumably primary were differentiated from secondary attacks on the statement of the individual soldier. This same procedure, at one time adopted in our own army, was abandoned on account of its unreliability.

The Serbians, too, suffered badly from malaria, as also did the Bulgarians, a fact learned after the Armistice.

C. L.

HAMILTON (C. S. P.). **Malaria : Two Years' Experience on the Salonika Front.**—*Jl. Roy. Army Med. Corps.* 1921. May. Vol. 36. No. 5. pp. 361-369. With 1 chart in text.

One of the points on which stress is laid in this picturesque narrative is the influence attributed to lowered vitality in preventing the effective treatment of malaria by quinine; the lowering of vitality being itself assigned to heavy work and a life of unrelieved monotony, and passing by the local name of "Balkan tap." It had apparently been expected that mosquitoes would not be found at a height of over 2,000 feet, although experience in India alone would negative this, while their maximum flight was put at about 2,000 yards. [See, however, WENYON's article on Macedonian malaria.]

Instances are quoted of benign tertian fever with most indefinite symptoms, the diagnosis being made by blood examination. The prophylactic measures referred to were the anointing of exposed parts with Para Quit ointment, the issue of masks, gloves and bivouac mosquito nets, and quinine. In spite of them a 60 per cent. infection existed among the troops at one time. The treatment which is believed to have been generally carried out consisted in the administration of 40 grains of quinine in the first 24 hours, 30 grains in the second and

40 grains in the third, after which quinine was replaced by iron and arsenic. [That this inadequate dosage was only part of the reason for the disrepute into which quinine fell locally is evident from the perusal of WENYON'S paper, to which reference has already been made.]

C. L.

KEUKENSCHRIJVER (N. C.). **Eenige waarnemingen over Malaria bij de Hollandsch-Amerikaansche plantage mij. te Kisaran.** [Some Observations on Malaria in the Holland-America Plantation Company at Kisaran.]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1921. Vol. 61. No. 2. pp. 202-210. With 1 double plate.

This paper contains in a concise form much information about a malarial epidemic at Kisaran (East Coast Sumatra). Several (10) species of Anopheles were found on the rubber estates in question, of which *A. kochii* is considered to be the principal carrier. It was found infected in nature, and could be infected experimentally with benign tertian and malign subtertian in 5-10 per cent.

Often malarial parasites were found in the blood of patients without enlargement of the spleen. This is ascribed to the great quantities of quinine distributed on the estates.

Treatment of all parasite carriers was not sufficient to combat the epidemic, neither was treatment of all people with enlarged spleen, either with or without parasites in the blood. To reduce the chances of infection both groups should be treated daily for a considerable time with quinine.

Other accessory measures are valuable (improved feeding, drainage, oiling, light work, mosquito netting). Importation of new coolies proved to have a bad influence on the spread of the epidemic.

W. J. Bais.

GILL (C. A.). **The Rôle of Meteorology in Malaria.**—*Indian Jl. Med. Res.* 1921. Apr. Vol. 8. No. 4. pp. 633-693. With 1 chart, 1 map and 1 diagram.

Malaria is here considered as manifesting itself in two different ways: (a) epidemic malaria, evidenced by "determining, in the case of each district, the 'coefficient of variability' of 'fever' mortality, the calculation being made by multiplying the standard deviation of the autumnal 'fever' mortality (October and November deaths) by 100 and dividing the product by the mean 'fever' deaths during the same period"; and (b) endemic malaria, evidenced, provided no epidemic outburst has occurred within the last five or six years, by the spleen rate in children.

It is the case in the Punjab, with which alone this paper deals, that those areas with a high rate of endemic malaria are not those in which epidemic outbreaks occur. There is, moreover, a close association between epidemic areas and areas liable to flooding. As to the cause of this difference, there is epidemiological evidence that malaria in the Punjab is only transmitted if the mean monthly humidity (8 a.m. reading) be at least 63 per cent. and the mean monthly temperature at least 61° F. In support of the statement that it is precisely in those areas where these minima are least frequently attained that epidemic malaria is rifest there are cited two facts: (1) there is a close negative correlation between the intensity of epidemic malaria

and the mean annual potential infection period as measured on the criteria just mentioned; (2) in the Montgomery district epidemics are rare, yet when they occur they are of an intensity unequalled elsewhere in the Province. During the 17 years over which meteorological records are available there have been two periods of 30 months each during which there has been complete cessation of potential infection. Interruption of infection is accordingly looked upon as an essential factor in the mechanism of epidemic malaria.

On the basis of these general epidemiological findings experimental work was undertaken to test the effects of temperature, humidity and low atmospherical pressure (that is, inferentially, of altitude), on mosquitoes, particularly on their length of life, habits and power to transmit infection; and since in Lahore in April and May suitable malarial cases and Anopheles are both difficult to obtain, the experiments actually dealt with the parallel *Proteosoma* infection in *Culex fatigans* and sparrows. It was found that with a relative humidity of less than 40 per cent. *Culex* would not feed; with one between 40 and 48 per cent. *Culex* fed, but if infected died within five days; while with one over 50 per cent. they fed freely and survived. Accordingly *Proteosoma* cannot be transmitted with a humidity of less than 48 per cent. Regarding temperature, the details which apply to *Culex* and *Proteosoma* are not evidential of *Anopheles* and *Plasmodium*. For example, at 40° C. *C. fatigans* dies within 15 minutes, whereas *Anopheles culifaciens*, *A. stephensi* and *A. pulcherrimus* remain full of life. JANSO and others have shown that the lower limit of growth for *P. vivax* and *P. falciparum* in Anophelines is 16° C. (60·8° F.). As regards atmospheric pressure it was shown that between 25° and 28° C. with a relative humidity approaching 100 per cent. and with the mercury standing at 23 inches, corresponding to an altitude of between 5,000 and 6,000 feet, the development of *P. grassii* in *Culex fatigans* proceeds normally. Clearly, it is concluded, the rôle of meteorology in the transmission of malaria is important and claims definite medical recognition.

C. L.

ROUBAUD (E.) & LEGER (M.). **Observations sur le paludisme en Corse (mars-avril 1921).**—*Bull. Soc. Path. Exot.* 1921. June 8. Vol. 14. No. 6. pp. 340-351.

The work here recorded represents a rapid survey, made under the auspices of the Pasteur Institute at the end of March and beginning of April, 1921, of the general conditions prevailing in Corsica, with a view to the re-institution of antimalarial measures, which had been dropped during the war.

From the examination of 37 children, of which 16 were found infected, and from the comparison of these results with those previously obtained by Leger, it is concluded that the belief that within the last seven years malaria in Corsica has greatly increased is correct. The increase is attributed to conditions brought about by the war. Of 20 *Anopheles* [*maculipennis*] examined, young sporocysts were found in one—the salivary glands being free from infection in all. Of the 16 positive blood examinations, two contained gametes of *Plasmodium vivax* and one of those of *P. praecox*. These findings are in direct contradiction to those of GRASSI, who finds crescents absent at Fiumicino, near Rome, till the middle of July, the difference being explained by the fact that the Corsican examinations were made at

random and without any reference to history or clinical signs. They are taken to show that the possibilities of infection by the two parasites are at that period of the year practically identical, the priority of new infections in mass by the benign tertian parasite being attributed to its more rapid development in the mosquito, a physiological explanation which appears to the writers to fit better with the facts than does the assumption, with no proof offered, of a polymorphism.

Reverting to Roubaud's belief in the efficiency of animal houses as preventives of human malaria, it is pointed out that the claim has never been made that any type of stable, byre or hutch will serve this purpose effectively. To do so it must be of a height not exceeding 3.5 metres, sheltered from wind and sun, and animals must be regularly stabled therein at night; the intention being that the mosquitoes, having found happy conditions for food and housing within a few feet of one another, will rest therewith content. In such a byre, and only one such was found, many mosquitoes hung replete, the neighbouring dwelling-house being empty of them. Such animal houses, properly placed, built and used, can, it is believed, be made effective screens to keep human beings free from Anopheline attack.

Regarding breeding places it is pointed out that the large lagoons communicating with the sea are not, as is generally supposed, breeding places for Anopheles, although the canals which form the communications are so.

C. L.

REGNAULT (Félix). **Les causes adjuvantes du paludisme.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1921. June 23. Vol. 45. No. 21. pp. 927-929.

This paper deals actually with the conditions which favour the spread of malaria in Corsica. They are defined as overcrowding within the house, the whole family sleeping in one room, with the result that when one becomes infected the others establish a sort of monopolistic trust in the mosquitoes which feed on the infected member, the insects reciprocating by infecting them all; site crowding of houses, the better to avoid the effects of the vendetta; absence of animal houses, domestic beasts being free-living; poverty; ignorance manifesting itself as a belief that the mosquito is no carrier, but that the trouble arises from bad air. Education of children is suggested as the only way out of the present difficulties.

C. L.

FERGUSON (Eustace W.); HUGHES (Laurence H.); EVANS (Wilfred). **The Malaria Danger.** [Correspondence.]—*Med. Jl. Australia.* 1921. 8th year. Vol. 1. May 21. No. 21. pp. 432-433.

In the correspondence which has naturally followed upon the publication of autochthonous cases of malaria in New South Wales [this *Bulletin*, Vol. 18, p. 89], Ferguson, writing from the office of the Director-General of Public Health of New South Wales, points out that the following Anophelines have so far been found in Australia.—*Anopheles corethroides* and *A. (Myzorrhynchus) barbirostris bancrofti*, but not from New South Wales; *A. (Pyrethrophorus) atratipes*, but not abundantly; *A. (Pyrethrophorus) stigmaticus*, once only; *A. (Nysso-rhynchus) annulipes*, the common Australian Anopheline, extending

from Tasmania to the islands on the north. The possibility of the occurrence of endemic malaria has received serious consideration, and it has been concluded that such is unlikely to occur, since Anophelines are relatively scanty in urban, and human beings in rural, areas. The Murrumbidgee irrigation area is an exception, and here the policy has been to exclude settlers who are known to have suffered from the disease.

Wilfred Evans draws attention to a case of malaria reported by him in 1919 [this *Bulletin*, Vol. 15, p. 422], and points out that the grave apprehensions of the likelihood of a serious Australian epidemic, which he then voiced, have not been justified.

C. L.

DOYLE (Gerald). **Clinical Reports of Two Unusual Cases.** [One Malaria.]—*Med. Jl. Australia*. 1921. 8th year. Vol. 1. May 21. No. 21. p. 421.

A man who had never been out of the State of Victoria, and had spent all his life at St. Arnaud, with the exception of a fortnight at Mildura, latitude about $34^{\circ}2'$ S., developed typical tertian malaria, confirmed by the finding of *Plasmodium vivax*.

C. L.

GRASSI (B.). **L'Anofele può propagare la malaria anche direttamente?** [Can Anopheles transmit Malaria directly?].—Reprinted from *Reale Accademia Nazionale dei Lincei*. 1921. Jan. 2. Vol. 30. No. 1. p. 2.

In the summer of 1920 Anopheles were comparatively scarce in Fiumicino, and of 200 examined all were found to be uninfected. Moreover, cases of relapse in chronic malaria patients were very few.

In a cottage in this district, where no relapse had occurred, a baby, a few months old, developed a primary subtertian infection. A youth significantly infected with the same form of parasite had stayed in the house about a week previously.

From this and other similar local coincidences Grassi wonders whether malaria may be transmitted directly by a mosquito regurgitating infected blood into the body of a healthy individual.

It should be quite possible to test this theory experimentally.

J. Rosslyn Earp.

SCHLESINGER (W.). **[Activation of Chronic Malaria.]**—*Wien. Arch. f. innere Med.* 1921. June 30. Vol. 2. No. 3. p. 241. [Summarized in *Jl. Amer. Med. Assoc.* 1921. Aug. 27. Vol. 77. No. 9. p. 742.]

Believing that the appearance of parasites in the blood stimulates production of antibodies and is therefore a favourable sign, and aiming at inducing such appearance without consequent symptoms, Schlesinger suggests that the problem may be solved, not by intragluteal injections of 2-3 cc. of a 10 per cent. solution of sodium nucleinate, as he himself has done, but by the rectal administration of nucleinic acid in the form of active yeast, or by the oral administration of calf's thymus or other food rich in this substance. He suggests a correlation between the flaring up of malaria in the spring and the eating of fresh green vegetables. So far as one can gather from the abstract the matter is put forward as pure conjecture.

C. L.

LABASTIE. **Des rapports du paludisme avec certaines infections.**—*Presse Méd.* 1921. Aug. 24. No. 68. pp. 1221–1222.

Noting that among troops in Cilicia those heavily infected with malaria were not found showing lesions of syphilis or tuberculosis, that in 23 cases with tubercular lesions only four, or 17 per cent., suffered from malaria, the type being benign in all instances, while in 10 cases of syphilis, only one, or 10 per cent., showed a benign tertian infection, and that only after the administration of neosalvarsan, while the general percentage of malarial infection among the troops was 63, the writer concludes that there is an antagonism between malaria and these two other diseases. He attributes this immunity against malaria to the hyperleucocytosis induced by tuberculosis and syphilis, and finds confirmation of his belief in that his figures show special rareness of malarial infection when there exist glandular and osseous tubercular lesions—lesions, that is, of the tissues which produce leucocytes.

[The argument implies that tubercular inflammation induces excessive action of affected organs and tissues, but since the diagnosis is throughout purely clinical it is unnecessary to follow the writer further.]

C. L.

BLACKLOCK (B.). **Notes on a Case of Indigenous Infection with *P. falciparum*.**—*Ann. Trop. Med. & Parasit.* 1921. Apr. 27. Vol. 15. No. 1. pp. 59–72. With 2 text figs.

Blacklock reports further on the recent fatal indigenous case of malaria reported from Liverpool [this *Bulletin*, Vol. 17, p. 136]. In the blood after death one third of the erythrocytes contained young trophozoites, many with two, three, four or five parasites, and there were present in nearly equal, but in small numbers crescents, and fully segmenting forms each with 10 to 24 merozoites. Nucleated erythrocytes numbered 4·9 per cent. of the total leucocytes, and pigment was present in the mononuclears and in the plasma. The spleen contained a few spherical, oval, or crescentic gametocytes, fifteen times as many segmenting forms with 8 to 22 merozoites, and considerable black and golden pigment. In the bone marrow the picture was quite different. There were a few segmenting forms, ten times as many crescentic and oval gametocytes, and many eosinophilic large mononuclears.

It is concluded that in all probability the fatal attack was a primary one; that, there being nothing to support Ross's query as to the possibility of direct inoculation of infected blood, the vector was an infected mosquito; and that, should the infection, as previously suggested, have been obtained at a neighbouring health resort, this would leave seven days for parasitic incubation, four days during which sporulating parasites were present in the blood, and five more for the formation of crescents—all reasonable periods.

STEPHENS and CHRISTOPHERS' suggestion that the delayed appearance of crescents, compared with that of merozoites, is due to the lapse of time required for the appearance of immunity is not accepted, it being pointed out that many primary cases in which the process of crescent formation is already established in the bone marrow nevertheless die; and the late appearance of crescents in the peripheral blood "is explained on the ground that the source from which they arise," namely, the bone marrow, "is limited in extent."

C. L.

CODA (Maria). **Anemia perniciosa e malaria.**—*Policlinico*. Sez. Med. 1921. Mar. 1. Vol. 28. No. 3. pp. 123-136.

Two cases which have a bearing on the relation of malaria to pernicious anaemia are described in this paper.

P.B., a soldier of the class 1878, developed malaria on active service in 1916, though this was not the first occasion on which he had been infected. He recovered sufficiently to resume his trade as a carpenter, and then came back for treatment on account of anaemia. The red cell count when first taken was 900,000, and subsequently fell as low as 650,000. He had anorexia and diarrhoea. Achylia was noted. The blood picture was typical of pernicious anaemia: the colour index was high, 1.1 to 1.5; there were present anicytosis, poikilocytosis, hyperchromic megalocytosis, normoblasts and megaloblasts, leucopenia, with relative lymphocytosis.

The patient was treated with Baccelli's mixture. He developed first an irregular fever and then definite malarial attacks. Large doses of quinine were added to the treatment, and the malaria was controlled. Under continued treatment with Baccelli's mixture the blood count also began to improve. He left hospital with a red cell count of 3,500,000, a white cell count of 6,000, and a colour index of 1. He has since been under observation for four years, and at present is well, with a perfectly normal blood picture.

The second case, also a carpenter by trade, was found with severe anaemia at the beginning of what he believed to be his first attack of malaria. On the first day the red cell count was 1,200,000, with some anicytosis, anisochromia, especially hyperchromia, a few normoblasts and myelocytes, and very few megaloblasts. The percentage of haemoglobin was 35 and the colour index 1.4. Parasites were found in the blood from the same day. The anaemia improved rapidly, however, under quinine treatment. The rapid recovery in this case might lead to some doubt as to whether it was really of the type first described by ADDISON, though the blood picture is typical enough.

J. Rosslyn Earp.

CASTELLANI (Aldo) & WILLMORE (J. Graham). **Glycosuria of Malarial Origin.**—*Brit. Med. J.* 1921. Aug. 20. p. 286.

In the first of the two cases here detailed a man of 32, pale and tremulous, with no physical signs, with a blood showing a normal count but no malarial parasites, with sugar up to 8.5 gm. per litre of urine, and a history of a first attack of malignant tertian malaria about four years earlier, followed by numerous subsequent relapses, was given three 10-gr. doses of quinine daily and later an additional course of six intramuscular injections of quinine hydrochloride of 6 gr. each. The glycosuria disappeared, although no alteration had been made in the diet.

In the second case a man with polyuria, increased hunger and thirst and progressing emaciation, with a urine in which sugar had reached 2 per cent., very anaemic and earthy-looking and showing patches of hyper-pigmentation, with a spleen just palpable and very hard, with no malarial parasites in the peripheral blood, but a history of severe malarial infection contracted some four years earlier in the Balkans, was placed on a very strict diet by a medical man before coming to the writers. This led to but little reduction in the glycosuria. After taking 10 gr. of quinine thrice daily for three weeks the amount of sugar decreased to 0.1 per cent. Believing that there was here an instance of a diabetic syndrome in a malarial subject, he was permitted to revert to an ordinary diet. The glycosuria did not increase. While

in South Europe on business the patient stopped taking quinine, and was rewarded on his return by a rigor accompanied by high fever and sweating, the spleen becoming hard and palpable, a few malarial rings appearing in the blood, and the glycosuria reaching 1·2 per cent. He was placed on an intensive quinine treatment by mouth, supplemented by intramuscular injection, for six weeks, the diet not being restricted. Not only did the evidence of the chronic malarial infection disappear, but the urine became completely free from glucose. There is, then, reason for believing that glycosuria may be of malarial origin.

C. L.

HARRISON (G. A.). **Glycosuria of Malarial Origin.**—*Brit. Med. J.* 1921. Oct. 22. pp. 630–631. With 1 chart in text.

Referring to CASTELLANI & WILLMORE's case, it is reported that a Jew, aged 32, contracted malaria in Indore (India) in 1920, and next year developed excessive thirst, with glycosuria. In England the malaria recurred, but on a full diet the sugar found did not exceed 0·2 per cent. He was treated with full doses of quinine, after which 50 gm. of glucose in the morning on an empty stomach failed to produce glycosuria. Speculation as to the mechanism of production of the glycosuria follows.

C. L.

FRÓES (João A. G.). **A Case of Afebrile Quartan Malaria, with Urticaria.**—*Jl. Trop. Med. & Hyg.* 1921. Aug. 15. Vol. 24. No. 16. pp. 215–216.

A coloured woman of 25, resident in a malarious district in Brazil had never had clinical malaria, but came under observation as suffering every fourth day at eleven o'clock from urticaria. A fortnight's observation confirmed the statement but revealed no physical signs; it disclosed, however, quartan parasites in the blood, as had been suspected. Clinical cure, without disinfection, followed the administration of quinine. The writer has had two similar cases caused by *Plasmodium vivax*, and notes that he has observed malarial polyneuritis.

C. L.

LEIGHTON (William E.). **Spontaneous Rupture of the Malarial Spleen, with Abstract of Cases reported between 1842 and 1921.**—*Annals of Surgery.* 1921. July. Vol. 73. No. 1. pp. 13–19.

This paper narrates the case of a white waiter, aged 35, admitted to hospital with a two weeks' history of malaria, "malarial plasmodia of the tertian variety" in the blood, a rigid abdomen and epigastric and left hypochondriac tenderness, a tender, enlarged spleen, a temperature running to 102°, and an appearance as of shock. Severe abdominal pain supervened at night, and a ruptured spleen was diagnosed. At operation two parallel rents were found on its outer surface, and since tampons controlled the bleeding it was not excised. Bronchitis and cough developing, the wound, closed only by plaster, opened, and the omentum protruded, necessitating the removal of the tampon and the sewing up of the wound in layers, with drainage. Recovery followed. The accompanying abstract of cases will be found most useful, provided it is not assumed to be complete.

C. L.

- i. ACTON (Hugh W.), RENNIE (P. M.), CURJEL (Dagmar F.), & DEWEY (J. O.). **The Diagnosis and Treatment of Benign Tertian and Malignant Tertian Fevers.** Sections I-III [by Acton, Curjel & Dewey]. Section IV.—What Constitutes a Cure [by Acton]. Section V.—The Effect of Quinine on Benign Tertian Infection [by Rennie, Acton, Curjel & Dewey]. Section VI.—The Effect of Repeated Courses of Quinine on the Benign and Malignant Tertian Parasites [by Acton, Curjel & Dewey]. Section VII.—The Curative Value of the Total Alkaloids (*Cinchona febrifuge*) of *Cinchona*. **Bark on Benign Tertian Infections** [by Acton, Curjel & Dewey].—*Indian Jl. Med. Res.* 1921. Apr. Vol. 8. No. 4. pp. 750-773. With 3 coloured plates: 774-786. With 1 folding chart: 787-852: 853-860: 861-871.
- ii. ACTON (Hugh W.). **The Value of Quinine Prophylaxis.**—*Ibid.* pp. 741-749.

i. Situated at Dagshai, in the sub-Himalayas, at an altitude of 6,000 ft., where anopheles are rare and where in a four years' experience Acton has never seen a case of malaria which could reasonably be classed as having been locally contracted, a depot for soldiers, proved microscopically to have been infected with one of the malarial parasites, afforded the material on which this work is based. All these men had been given quinine before reaching Dagshai. After their arrival their outstanding feature was the almost regular occurrence of relapses due to the benign tertian parasite, and the almost complete absence of those due to the malignant tertian one. The conclusion reached is that quinine is a specific poison for the latter parasite, but not for the former. To establish, or facilitate criticism of the writers' diagnosis the trophozoites of the three forms of malarial parasite are distinguished by three coloured plates, full written descriptions, and a table, here reproduced.

BENIGN TERTIAN.	MALIGNANT TERTIAN.	QUARTAN.
<i>Accolée forms</i> :—		
1. Usually lateral in position.	1. Lateral in position.	1. Central in position.
2. The parasite is continuous with the contour of the erythrocyte.	2. Projecting from the erythrocyte like a nipple.	2. Bird's eye in appearance.
	3. Rarely anaplasma forms seen.	
<i>Pseudopodial forms</i> :—		
1. Irregular kite-like forms with reniform or bipartite chromatin.	1. Bizarre in shape, usually a single pennant with division of the chromatin.	1. When viewed on the flat, comet or flame shaped.
2. The erythrocytes are enlarged, with Schüffner's dots.	2. Some of these may simulate an equatorial band form.	2. When viewed on the side, as an equatorial band form.
3. Rarely dendritic forms seen.		
<i>Non-pseudopodial forms</i> :—		
1. Large rings or globular forms in enlarged erythrocytes with Schüffner's dots present.	1. Small rings with early fission of chromatin, or signet ring-like, in corpuscles that are slightly smaller than normal.	1. Parasite seen elliptical in shape and as it grows larger assumes the equatorial band form. Corpuscle not enlarged.

Judged by these standards malignant tertian infections were almost absent in the cases under consideration. That this absence was not due to a previous faulty diagnosis having confused the young trophozoites of the two tertian forms (quartan forms were almost entirely absent) was proved by the comparison of 102 cases in which crescents, a form practically unmistakable, had been recorded in the medical history sheets, with 102 cases in which the history sheet recorded a microscopic diagnosis of benign tertian infection. In the first series there occurred during eight weeks of observation 64 benign tertian, and in the second 76 benign tertian, relapses, no malignant tertian relapses having occurred in either series. That this state of affairs was not due to a seasonal prevalence was shown by its persistence throughout the autumn and winter months, for in those months the prevalent infection in these areas is the malignant tertian. It is accordingly concluded that malignant tertian infection must have been eliminated by quinine treatment before the cases reached Dagshai. That being granted, to what is this elimination due? Is the benign tertian a mutation form of the malignant tertian parasite produced either spontaneously or, as the French school holds, as the result of quinine administration? Against this are the facts that the two forms differ in morphology, cultural characteristics, incubation period and symptomatology, to which is now added on the basis of this work, reaction to quinine, and by the fact that benign tertian malaria appears where no quinine has been taken. It is accordingly concluded that the benign tertian parasite is quinine-resistant.

The point next considered is the extent to which quinine will cure benign tertian fever, and as a preliminary it becomes necessary to establish the sense in which the term "cure" is used. The mechanisms of natural and artificial cures are clearly looked upon as quite different. It is evidently not considered the case that quinine aids the natural processes of cure. Natural cure is stated definitely to result from the gradual conversion of the whole of the asexual cycle into gametocytes, which subsequently, and shortly, die of senility. The validity of this contention is apparently dealt with in section VIII, not yet published. On the other hand, quinine and other cinchona alkaloids are considered to cure by destruction of the asexual cycle, an eventuality which, it must be concluded, is not considered to occur naturally.

Cure occurs in three phases (i) immediate, relative [or clinical] cure and (ii) partial cure, both effected by destruction of the greater part of the asexual cycle, there being in the latter case reappearance of parasites in sufficient numbers to cause symptoms; and (iii) complete cure, the result of complete disinfestation.

Cure brought about by quinine is looked upon as a fractional process, a certain and definite proportion of each new cycle being destroyed by each course of treatment. Provided sufficient has been given and absorbed, the efficacy of quinine is considered as dependent upon the number of parasites present and the rate of their destruction, while its failure is explained as a question of relative accessibility. The argument runs thus. RAMSDEN and others have shown that 90 per cent. of quinine injected intravenously disappears from the blood within one minute, accumulating in the tissues. Benign tertian parasites multiply in the blood, where the concentration of quinine is slight and interferes little with schizogony and the growth of young forms. Malignant tertian parasites multiply in the organs

where quinine is concentrated and so are readily destroyed. The argument seems to assume that concentration of quinine is greater in blood passing through quinine-containing tissues, or alternatively that schizogony may occur in those tissues and not in the blood.

Having established the senses in which the term cure may be used, a return is made to the effect of quinine on benign tertian infections. It was found that in 100 cases 2 to 5 intravenous injections of the acid hydrobromide or the bihydrochloride of quinine in doses of 5 to 10 gr., followed in the majority of cases by oral quinine for 8 weeks, caused rapid disappearance of the parasites with a cure percentage of 18. Twelve intramuscular injections of quinine bihydrochloride in 7-gr. doses every third day, with 30 gr. of quinine orally on the alternate days produced in 94 cases a cure percentage of 27·6, with an average quinine dosage of 1,284 gr. Apart from the above, the sulphate of quinine was given orally, either continuously or intermittently, in four series of cases. In the first continuous series 76 persons received 30 gr. daily for 21 days, followed by 15 gr. daily for 90 days, as advised by ROSS & THOMSON, with a cure percentage of 52·6, and an average dosage of 1,980 gr. In the second continuous series 190 persons received for 21 days a daily dose of 39 gr., followed by an iron and arsenic tonic, with a cure percentage of 42 and an average quinine dosage of 300 gr. In the two intermittent series the drug was given on two consecutive days weekly for eight weeks as recommended by STEPHENS. In the first intermittent series 90 men received each 45 gr. daily, in three 15-gr. doses, with a cure percentage of 18·8 and an average dosage of 720 gr. Many cases suffered from vomiting towards the end of this course. In the second intermittent series 113 men received, without toxic symptoms, 30 gr. daily in two 15-gr. doses with a cure percentage of 30 and an average total dosage of 480 gr. In a total of 663 cases the average cure percentage from a single course of quinine was 32·4. Every benign tertian relapse was, however, followed by an eight-weeks' course of quinine. The percentage of cure following each of four courses of quinine was more or less constant, being 28·9, 20, 28·8 and 20 respectively; or 24·4 on the average. The cure percentage of two eight-weeks' courses, if considered together, is about 45, while that of ROSS & THOMSON for four months is 52·6, a difference which is considered to be within that of chance distribution. Sixteen such courses would theoretically be necessary for a cure. Regarding the percentage of cure for malignant tertian infection, of 131 persons so diagnosed in the medical history sheets [the relationship of this series to the 102 cases bearing crescents similarly reported being uncertain] 13 relapsed.

The causes determining the partial refractoriness of certain persons to cure by quinine is explained on the same lines as is the general refractoriness of the benign tertian parasite, namely, by the concentration of quinine in the portal system, a purely chance distribution of the parasites determining whether or not they enter the portal area during their vulnerable stage.

One of the most interesting conclusions reached in the paper is the high value attached therapeutically to cinchona febrifuge. Since the use of the total alkaloids of cinchona would relieve the excessive drain occurring in the cinchona plantations in India, the result of the sole use of quinine, and since PRAIN & WATERS have considered it as good as, or better than, quinine weight for weight, it was determined

to test its value under the exceptionally satisfactory conditions regarding possible reinfection which prevail at Dagshai. Two series of cases were observed. In each the daily dose was 21 gr. given continuously, in the first series to 53 men for 21 days and in the second series to 57 men for 10 days. The cure percentage in the first series was 50·9 and in the second 52·6, or exactly the same as occurred in ROSS & THOMSON's four-months' course. The treatment, which was in tablet form, was popular, without cinchonism or gastric symptoms, and at one-twentieth of the cost of ROSS & THOMSON's. It is stated, while dealing with quinine, that only in one series did approaching demobilization, with its accompanying possibility of the unauthorized taking of quinine to make cure certain, possibly vitiate conclusions. This point is not mentioned when considering cinchona febrifuge. Clearly their importance, clinical and financial, renders essential the repetition and amplification of these experiments on cinchona febrifuge.

(ii) Apart from the data mentioned in (i) ACTON points out that HODGSON has shown that flagellation of the male, with consequent fertilization of the female, gametocyte only occurs while the wet bulb temperature lies between 18° and 22° C., and that prophylactic measures are consequently only required when these conditions are fulfilled. Quinine, if used for this purpose, should be administered in curative doses, that is in doses of 10 or 12 gr. daily, or at most every other day, for seven months. On account of the expense, quinine should be used for troops as a prophylactic measure only when they are on the march or in temporary camps. He advocates that the money thus saved should be spent on electric fans, clearly considering them as sufficing to keep off mosquitoes, as they certainly suffice to convert discomfort into comfort.

[To avoid confusion in the minds of those who refer to the original, it may be pointed out that the reference in (ii) to sections 2, 5 and 6 of (i) as of date 1919 refers to the date of editorial receipt and not to that of publication; that the well-known *Indian Medical Gazette* is camouflaged as the *Indian Medical Journal*, and the equally well-known Professor STEPHENS as Stephen; that the portal vein does not carry blood from the intestine to the spleen; that in a vulgar fraction the numerator does not lie below the line; that on p. 857 the figures 2·89, 2·88 and 3·44 should read as 28·9, 28·8 and 24·4 respectively, and that the graph mentioned there is missing, at least from the abstractor's copy. The creation of the new office of Director of Medical Research in India, the holder of which has the editorship of this *Journal* as part of his duties, has been followed by the bringing of the *Journal* to date. It can confidently be expected that the energy which has got rid of heavy arrears will presently show itself in more detailed proof reading than the overburdened editor has always found possible in the past.]

C. L.

ROSS (Ronald). **Observations on the Principle of Repeated Medication for curing Infections.**—*Brit. Med. Jl.* 1921. July 2. pp. 1-4.

This paper should be read in its entirety. Only a few points can here be selected for notice. There is salutary insistence on the persistent confusion, under the term "immunity," of two entirely different matters, namely, destruction of parasites and compensation of the ill effects which they have caused to their hosts. There is prominence

given to the Single Dose Reduction Rate, which implies that a single dose of medication—in this case quinine—will in nearly all cases reduce the parasites by a definite number or a definite fraction. The dose of quinine recommended on these lines is a 10 gr. daily dose carried out rigorously for 12 weeks—a dose found to suffice in the large majority of cases. In the matter of large doses it is pointed out that the organism subjected to them appears, so to speak, to sense risk of poisoning, and throws them out with increased rapidity, so that the amount of quinine actually circulating is lessened, not increased, by heroic doses. Similarly in the case of the development of resistance to quinine such as the brothers SERGENT have reported [this *Bulletin*, Vol. 18, p. 96] Ross considers that it is probably evidence of an excessively rapid excretion of quinine or its metabolite by the host, rather than of a tolerance to the drug developed by the parasite. [In the SERGENT's case the resistance to quinine was, however, retained in full during the passage of the strain through three canaries in all, and in lessened degree through a fourth.]

C. L.

BRAHMACHARI (U. N.). The Treatment of Malarial Fever in Individuals Susceptible to Attacks of Blackwater Fever by Intravenous Injection of an Antihæmolytic Quinine Solution.—*Indian Med. Gaz.* 1921. June. Vol. 56. No. 6. pp. 203-205.

The following observations are based on experiments, the numbers of which, when stated, do not in any case exceed three. The hæmolytic properties of quinine and its salts, as tested in vitro, are exhibited in decreasing degree by the bihydrochloride, the hydrochloride, the bisulphate, the sulphate, and the alkaloid. The alkaloid is not absorbed as such when given by the mouth, being converted into one of the chlorides. It is necessary, therefore, to give the alkaloid intravenously. This may be effected by the following solution :—

Quinine alkaloid	..	..	..	5 gr.
Alcohol ..	..	..	..	50 minims.
Urethane ..	..	..	..	3 gr.
Calcium chloride	..	..	..	7.5 gr.
Glucose ..	..	..	..	300 gr.
Normal saline ..	..	..	..	200 cc. (0.85 % solution of NaCl in distilled water.)

Calcium chloride and glucose help solution of the alkaloid, besides being cardiac stimulants. It is also hoped that they will inhibit any hæmolytic action of the quinine, and any hæmolysis appearing in blackwater fever. Since 1 cc. of this solution added to a "hæmolytic system" produces no hæmolysis, it is claimed that the solution is actively anti-hæmolytic. Further, its injection is said to cause no fall of systolic blood pressure, and it is suggested that it be given a trial in blackwater fever.

C. L. ♦

BASS (C. C.). The Standard Treatment for Malaria.—*Public Health Rep.* 1921. July 1. Vol. 36. No. 26. pp. 1502-1504.

In order to popularize Bass's standard treatment of malaria [this *Bulletin*, Vol. 18, p. 97], arrangements have been made to issue quinine sulphate in the form of an eight-weeks' treatment, consisting of 112 capsules of 3, 4 or 5 gr., one or two capsules of the different

values being taken according to age. For children under eight "it is prepared in aromatic syrup of yerba santa, each teaspoonful containing the desired dose according to the doses recommended in the Standard Treatment for different ages."

C. L.

HYLKEMA (B.). [In Dutch and English.] **De ontwikkeling van de parasiet der quartana in de *Myzomyia ludlowi* en haar overbrenging op den mensch.**—**The Development of the Parasites of Quartan Malaria in the *Myzomyia ludlowi* and their Transmission on Man.**—*Meded. Burgerlijk. Geneesk. Dienst in Nederl.-Indië.* 1920. Pt. 6. pp. 50-99. With 2 charts and 1 plate.

This is a particularly full and careful account, with excellent references to relevant literature, of experiments showing that in Belawan [N.E. Sumatra] *Anopheles ludlowi* can regularly be infected with the quartan parasite to the extent of 20 per cent., and occasionally to 50 per cent. The insect becomes infective 11 to 13 days after the infecting feed. The quartan cysts are smaller than those of subtertian to begin with, and do not grow so quickly, but the two species of cysts cannot be distinguished *inter se* by their pigment. The susceptibility of *A. ludlowi* for quartan infection, but not for subtertian, decreases with length of captivity (= age), and, as with subtertian, the growth of the cysts is delayed by the same cause.

A. A.

RODENHUIS (Y.). **Dubbel- en superinfectie bij malaria tertiana.** [Double and Super-Infection in Benign Tertian Fever.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 2. pp. 123-129. With 1 coloured plate.

In cases of malign subtertian, double infection of the red blood corpuscles is a well-known phenomenon; but it is less common in benign tertian fever. The author mentions five cases of the last disease in which red blood corpuscles containing two or three, or even up to six, parasites were found to be present in an unusually high number. All these cases were relapses after a latent period of some duration. Besides a generation of young parasites, the blood films showed older schizonts, segmentation forms and many gametocytes. Of the infected erythrocytes, the author found up to 21 per cent. with double or triple infection. Red blood corpuscles containing gametocytes showed young parasites besides these up to 17 per cent. of their total number.

These percentages are far higher than could be expected on account of the chance calculation the author gives. He therefore thinks that a certain category of red blood corpuscles is more susceptible to malarial infection than the others, and concludes that "in cases where relative immunity does exist (spring relapses in Europe or after latent periods) benign tertian fever can cause many double infections by accumulation of young parasites in a proportion of the red blood corpuscles which has lost immunity. To this proportion belong the already infected ones (containing gametocytes), the granular basophiles, and possibly the polychromatophiles.

"If entering into an erythrocyte containing a gametocyte, the merozoite may happen to get into the protoplasm of a female gametocyte, in this way probably destroying the last. Development of

schizonts beside a gametocyte may give pictures much resembling parthenogenesis" [see this *Bulletin*, Vol. 11, pp. 1-3].

The occurrence of double infection proves to be less pathognomonic of subtertian fever than hitherto it was supposed to be.

[Some details of the plate are not convincing.—C. L.]

W. J. Bais.

- i. LEVY (Moise D.). **The Wassermann Reaction in Malarial Fevers.**—*Amer. Jl. Trop. Med.* Baltimore. 1921. Sept. Vol. 1. No. 5. pp. 313-317.
- ii. ST. JOHN (J. H.). **The Wassermann Reaction in Malaria.**—*Ibid.* pp. 319-329.

These writers reach opposite conclusions. Levy, in 50 cases, found four reacting positively, although without history or signs of syphilis, but he believes that the men were syphilitic. St. John found a positive reaction in 4.9 per cent. of 101 cases of acute malaria, but none in 16 chronic cases, all without evidence of syphilis, and considers the former as "due to an undetected increase in the anti-complementary factor."

C. L.

TEMPELAAR (H. Ch. G.). **Bijdrage tot de morphologie der malaria-parasieten.** [Contribution to the Morphology of the Malarial Parasites.]—*Geneesk. Tijdschr. v. Nederl.-Indië.* 1921. Vol. 61. No. 2. pp. 130-137. With 1 coloured plate.

Vital fixation of a blood film is possible by exposing it immediately to the vapour of osmic acid, developing from a half per cent. solution of this acid on the addition of a few drops of concentrated acetic acid. The parasites, after staining in the usual way, show features different from those obtained after application of the usual fixing methods. The author considers the characteristics of the parasite which do not appear after osmium fixation (contracted shape of the parasite, presence of vacuoles) as artificial products caused by the death of the protoplasm. In the osmium films the protoplasm of the parasite appears divided in the erythrocyte. For further details the original should be seen.*

W. J. Bais.

BERTARELLI (E.). **Tentativo di trasmissione della malaria al macaco.**—*Ann. d'Igiene.* 1920. Nov. Vol. 30. No. 11. pp. 689-690.

Between July and October 1918 the writer took advantage of the possession of a female ape (*Macacus cynomolgus*) to make three attempts to transmit directly the infection of malaria by the injection of citrated blood taken from patients. The first two patients selected were infected with the tertian parasite; the third case was one of aestivo-autumnal fever. In the first case 12 cc. and in the second case 15 cc. of citrated blood were administered intravenously; in the third case the infected blood was introduced first into the vein and afterwards into the peritoneum. Although in all three cases the human blood was seen to contain parasites, asexual as well as sexual forms, none of the experiments was successful in transmitting infection.

J. Rosslyn Earp.

* The osmic acid vapour method of fixation was described by MINCHIN in 1909 (*Quart. Jl. Mic. Sci.*) and may be of earlier origin.—ED.

MARTINI (E.). **Die biologische Malariaabekämpfung in Mazedonien.** [Biological Antimalaria Work in Macedonia.]—*Ztschr. angew. Ent.* Berlin. 1921. Feb. Vol. 7. No. 2. pp. 225-286. With 7 text figs. [Summarized in *Rev. Applied Entom.* 1921. June. Vol. 9. Ser. B. Pt. 6. pp. 91-92.]

According to the summary cited this paper describes comprehensively the antimalaria measures undertaken on the German Balkan front in 1918 up to the time of the German retreat. The commonest Anopheles was *A. maculipennis*, the larvae of which were found in all kinds of water where there is no open current, and regularly associated with *Culex hortensis*. Next in abundance was *A. palestinensis*, particularly in the warm region of the lower Varda, usually associated with *Culex mimeticus*; females of *palestinensis* sometimes hibernate. *A. bifurcatus* was not very numerous; it was observed up to 5,000 feet. *A. sinensis* var. *pseudopicus* was captured only once. *A. plumbeus* also occurs. The Culicines observed are mentioned severally and specifically.

A. A.

STANISLAS. **Contribution à l'étude de la lutte anti-paludique en Macédoine.**—*Arch. Méd. et Pharm. Milit.* 1921. Apr. Vol. 74. No. 4. pp. 427-429.

On the French military line—Yenitze-Vardar-Ostrovo—the splenic index was obtained in twenty-five villages, and regular quinization was established in the five of them most severely affected. Antilarval measures were instituted about these same five villages, namely, canalization, regularization of banks of streams, removal of scrub, and petrolage. In some cases the effects in mosquito reduction were rapid and striking, but, so long as irrigation is carried out with its present disregard of care, complete removal of breeding places is impossible. Tents were screened, mosquito nets provided, and quinine administered, the last checked by surprise tests of the urine, which showed that the percentage of those taking quinine properly rose from 72 at the beginning of the operations to 95 at their end.

As a result, the members of the malaria commission remained without a single case of malaria. No reference is, however, made to the health of the French troops in general.

C. L.

GÉNÉVRIER (J.). **Prophylaxie du paludisme en milieu militaire.—De la stérilisation du paludisme par les injections intraveineuses de quinine.**—*Bull. Soc. Méd. Milit. Fr.* 1921. Apr. 21. Vol. 15. pp. 137-145, avec remarques de Visbecq, Pouy, Wissemans. [Summarized in *Bull. Inst. Pasteur.* 1921. July 30. Vol. 19. No. 14. p. 524.]

Génévrier claims that the best way of preventing malaria is by sterilization of carriers, and that this is most satisfactorily effected by intravenous injection of quinine, which is effective in the first stage (lasting for the first 10 or 12 days after infection), useful in the second stage, and ineffectual in the third stage, that is, when visceral lesions have become established. Edm. SERGENT, in abstracting the paper, objects to the division into stages of an infection which is throughout a septicaemia. Visbecq notes that to abandon oral medication is impossible, and Pouy insists that the oral and intravenous routes have their respective places.

C. L.

YOFÉ (Hillel). **Proposals for Antimalaria Work in Palestine.**—*Internat. Jl. Public Health.* 1921. Sept.–Oct. Vol. 2. No. 5. pp. 478–487.

This is a piece of reasoned and reasonable special pleading by one whose thirty years' work in Palestine has left him with the certainty that his country has a great future if malaria can be eliminated. He formulates a scheme of control, of which the essential elements are (1) a trigonometrical, malarial and geological survey aimed at correlating the requirements of sanitation and agriculture; (2) the collection of morbidity and mortality statistics; and (3) an Anopheline survey in all its phases. A sanitary engineering and a sanitary medical service, adequately equipped and working with agricultural authorities, could utilize the favourable natural drainage of the country. By taking advantage of the Turkish law that unused marsh land becomes the property of him who drains it, there would be strong inducement for the finding of the funds necessary for this purpose. Those who own the land should pay for the free distribution of quinine by the State, the drug having in the writer's experience, proved to be an effective prophylactic. For the rest of the requisite funds an appeal is made to those who have at heart the welfare of Palestine and of the human race generally.

C. L.

1. LÓPEZ (J. A.). [Malaria and Tuberculosis.]—*Semana Médica.* Buenos Aires. 1921. May 12. Vol. 28. No. 19. p. 550. [Summarized in *Jl. Amer. Med. Assoc.* 1921. July 30. Vol. 77. No. 5. p. 412.]
11. SUGIYAMA (S.). On Nervous Otalgia preceding the Paroxysm of Malaria.—*Taiwan Igakkai Zasshi* (*Jl. of the Med. Assoc. of Formosa*). 1921. May 31. No. 216. (English summary, p. 2.) [In Japanese.]
111. JIMÉNEZ (R.) & PITTALUGA (G.). [Malaria recurs after Splenectomy.]—*Arch. de Cardiología y Hematología.* Madrid. 1921. June. Vol. 2. No. 6. p. 233. [Summarized in *Jl. Amer. Med. Assoc.* 1921. Sept. 10. Vol. 77. No. 11. p. 896.]

i. "López relates that in his experience with three generations of army recruits, he has frequently found that young men with a history of old malaria did not respond properly to quinin, and certain minor signs suggested superposed tuberculosis. Applying Vitón's tuberculin therapy with the minutest doses, supplemented with an antituberculosis vaccine, these men recovered, throwing off both the symptoms suspicious of tuberculosis and the malaria as well."

ii. "The author . . . describes in detail two cases of his latest experience who had severe ear-ache as a prodrome to malaria, that disappeared together with the paroxysm upon chinin treatment."

iii. "The woman of 31 had been apparently long cured of the tertian malaria but it flared up anew after removal of the enlarged spleen."

C. L.

PLAGUE.

Low (R. Bruce). **Reports on Public Health and Medical Subjects. No. 3. The Progress and Diffusion of Plague, Cholera and Yellow Fever throughout the World, 1914-1917.** With an Introduction by Sir George NEWMAN.—276 pp. 1920. Ministry of Health. London: Published by His Majesty's Stationery Office. [Price 7s. 6d. net.]

The section referring to cholera has been reviewed in a special article [this *Bulletin*, Vol. 18, pp. 69-77]. Yellow fever does not come within the scope of this section.

The population of India, according to the 1911 census, was 315,156,396, and from that year to the end of 1917 no less than 2,970,318 persons died of plague in India. The disease first appeared in Bombay in the autumn of 1896, introduced probably from Hong Kong, where there was an epidemic. From the date of the first infection to the end of 1917 the reported deaths amount to 9,841,396, but many deaths in outlying villages were most probably never reported. The village watchman, whose duty it is to report deaths, would, quite apart from his lack of medical knowledge, be anxious to conceal from sanitary officials the fact that plague existed, and, with his fellows, would make investigation difficult. The greatest intensity was reached in 1907. In that year 1,315,892 persons died, a rate per mille of 5.16. Of the total deaths 74.4 per cent. occurred in three presidencies:—(1) the Punjab; (2) Bombay; and (3) the United Provinces. The combined population of these three areas is about 98 millions. The distribution of population and the death-rate were:—

	Population 1911.		Plague Deaths 1896-1917.
The Punjab	24,187,750	..	2,862,852
Bombay Presidency	27,084,317	..	2,257,682
United Provinces .. .	47,182,044	..	2,201,811
	<hr/> 98,454,111		<hr/> 7,322,345

Much has been done by the Plague Commissions, the Royal Society, and the Lister Institute, to investigate the various features of the disease and to provide the individual members of the Indian Medical Service with powers to apply their knowledge in the treatment, eradication and prevention of the dread malady caused by *B. pestis* (Yersin). Why, then, does plague show "no obvious tendency, up to the time of writing, to cease its ravages in India?"

There is no doubt that the people themselves are chiefly responsible for lack of success in coping with the infection, which is endemic in certain areas in Northern India. Sanitary regulations are regarded, especially by Hindus and Mohammedans, whose women are kept behind the purdah, as affronts to religion, caste or custom. Political agitators make use of these prejudices, due in the main, to ignorance, to raise up opposition, often using methods which they must know to be wrong and without truth. Destruction of rats, so necessary to the stamping out of plague, is opposed, although they are killed to protect property by low-caste men. The Jain, the Buddhist and most Hindus, while personally refraining as part of their religion from taking the life, even of an insect such as the plague flea, have no rooted

objection to killing when it is done by a Dòm or pariah. Isolation of the sick and removal to hospital is resented, and even medical women have been mobbed. "No doubt the education of the native people is progressing, but it has not gone far enough as yet to effect much improvement in the incidence of fatal plague in India, judging by the mortality returns."

Dr. R. St. John Brooks has investigated the effect of hot weather on epidemic plague. His conclusions are: "That in India plague does not maintain itself in epidemic form when the temperature rises above 80° F. accompanied by a saturation deficiency of over 0.30 of an inch." By "saturation deficiency" is meant: "the difference between the actual tension of aqueous vapour present in the atmosphere at the temperature in question and the tension of aqueous vapour that would be present in a saturated atmosphere at the same temperature." There is, however, nothing to prevent plague spreading in India or elsewhere when once rats are infected and fleas have carried that infection to man in unsanitary ports and other areas. Moreover, septicaemic and pneumonic plague, the most dangerous forms, are independent, once started, of rats or fleas. The statistics of plague and the value of anti-plague vaccines have been fully noticed in this *Bulletin*, Vols. 14, 15 and 16. In anti-plague vaccines we have a medical weapon which can and should be used, not only for prophylaxis, but for treatment.

J. H. Tull Walsh.

FLU (P. C.). **Enkele epidemiologische waarnemingen over pest.** [Some Epidemiological Observations on Plague.]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1921. Vol. 61. No. 3. pp. 263-287.

Epidemiological observations were made by the author during outbreaks of rat plague at Palembang, Tandjong Priok, Batavia and Weltevreden in 1920.

He did not succeed in demonstrating the infection either in living rats caught round the ports or in the fleas they were carrying, notwithstanding rat plague was present, but only in corpses of rats found in the godowns. Cutaneous inoculation was found to be the most practical way to show the plague infection in material from rat corpses or from fleas.

From the epidemiological facts at Palembang the importance of rice transport for the spreading of rat plague is apparent. Till now the rats themselves have been considered to be responsible for the spread of the disease, but the author never found any dead rats between or in the rice bags in many godowns inspected. The corpses were always found under the heaps of bags between the floor of the godown and the plank floor on which the rice bags are piled up.

The author thereby was led to the presumption that infected fleas might play a more important part in plague spread by rice transport than infected rats. In many godowns guinea-pigs were used as flea traps to gather any fleas that might be living in or on the goods stocked. Rat fleas (*Xenopsylla cheopis*) were caught in every case, more in godowns with goods attractive to rats (rice, flour, dried fish) than in those with iron work, etc. Of 701 fleas caught in this way in different godowns after the outbreak of rat plague at Tandjong Priok 69 were found to harbour the plague bacillus. The fleas crawl over

the bags of rice and hide between the meshes, or may bore their way into the bags. They can easily be transported in rice, as infected fleas may go 10-14 days without food (HOESEN, SWELLENGREBEL). This confirms the author's views, but does not make the prospects of plague combating more hopeful, as fleas are far more difficult to control than rats.

The author therefore made another series of experiments to find out whether our most powerful means in plague quarantine at present, namely claytonage, kills the fleas with sufficient certainty. In bottles the fleas die immediately in an atmosphere containing 4 per cent. sulphurous acid, within one hour in half per cent. of the same. If a rice bag in the bottle offered a hiding place to the fleas many of them were found alive after two hours. In practice similar circumstances exist, and experiments made during the claytonage of a vessel had much the same results. The rice cargo also seems to absorb an important part of the gas introduced into the ship.

The author thinks that improvement in plague quarantine is necessary: (1) by using more powerful poisons in the place of sulphurous acid in claytonage, *e.g.*, prussic acid, which, however, is far more dangerous to man, and only practicable if the necessary precautions are taken; (2) by rat-proofing godowns and other buildings in the vicinity of the ports. The godowns should also be built in a way that makes it possible to close off the whole building without great expense, so as to make treatment with gaseous insecticides practicable.

W. J. Bais.

DOLD (Hermann). **Die periodischen Schwankungen der Rattenpest in Schanghai, ihre Beziehungen zur Temperatur und Feuchtigkeit.** [The Periodic Variation of Rat Plague in Shanghai in relation to Temperature and Humidity.]—*Ztschr. f. Hyg. u. Infektionskr.* 1921. Mar. 5. Vol. 92. No. 1. pp. 1-8. With 7 charts in text.

The author's work is given in useful "tables" and charts, which present clearly the relations set out for investigation. It will suffice to reproduce Table I and the charts for 1909 and 1914, since, in each chart, there is, in the months April to November, a marked fall in rat plague, with a rise in temperature and moisture.

TABLE I.

Year.	Number of rats found dead and examined.	Number of Infected Rats.	Per cent.	Cases of Human Plague.
1909 ..	17,364	187	1.08	0
1910 ..	19,559	249	1.27	6
1911 ..	14,929	138	0.90	0
1912 ..	14,988	95	0.64	18
1913 ..	13,333	122	0.90	2
1914 ..	12,782	186	1.44	23

To these may be added one chart compounded by Dr. Dold from the Report of the Indian Plague Commission (for *M. rattus* and *M. decumanus*).

J. H. T. W.

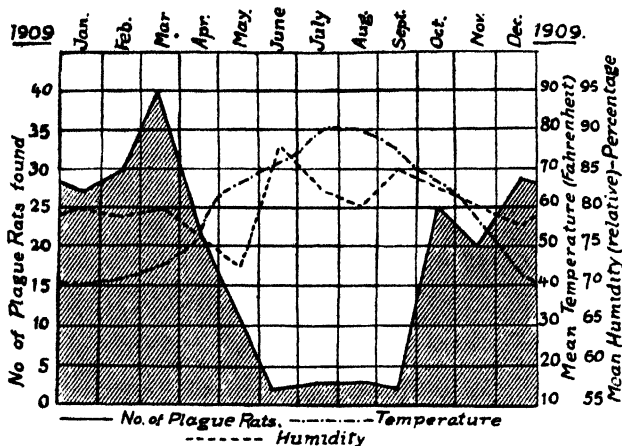


Chart 1.—1909.

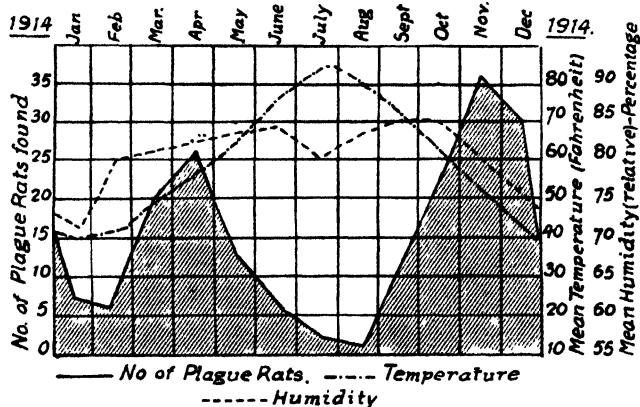


Chart 6.—1914.

Charts 1 and 6.—Showing monthly findings of Plague-infected Rats in Shanghai during 1909 and 1914, compared with Mean Monthly Temperature and Humidity. [D.O.L.B.]

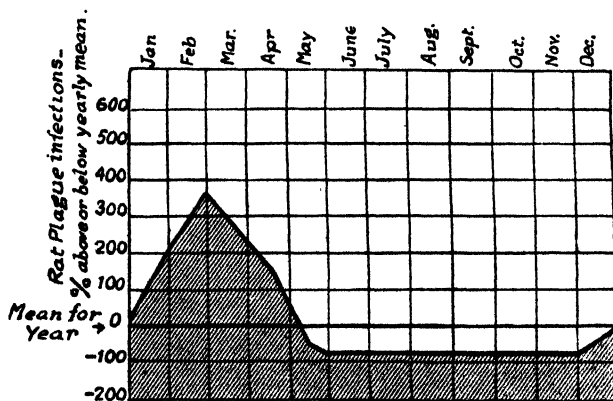


Chart 7.—Showing monthly findings of Plague-infected Rats (*M. rattus* and *M. decumanus*) in Bombay, expressed as a percentage above and below the mean for the year. [Based on curves of the Indian Plague Commission.]

CRAGG (F. W.). **The Distribution of the Indian Species of the Genus *Xenopsylla*, with reference to the Immunity of Certain Areas from Plague Epidemics.**—*Indian Jl. Med. Res.* (Special Indian Science Congress Number, 1920.) pp. 29-34.

Altogether 4,270 fleas were examined by Major Cragg. They came from 18 areas in India. Of the total number 64·5 per cent. were *cheopis*; 29·8 per cent. *astia*; 2·7 per cent. *brasiliensis*; and 2·89 per cent. belonged to the genus *Ceratophyllus*. These last were examined by Mr. ROTHSCHILD, who thinks they are probably not *fasciatus*. In the Punjab, *cheopis* predominates:—Rawalpindi, 92·8 per cent.; Ludhiana, 93 per cent.; Sialkot, 85 per cent.; Jullunder, 73 per cent.; and Jhelum, 86 per cent. From each of these stations a few *astia* were sent [do not bite man; see this *Bulletin*, BACOT, Vol. 16, p. 45]. *Brasiliensis*, which also does not readily bite man, was absent. All the fleas received from Multan belonged to *astia*. Of the doubtful species of genus *Ceratophyllus* [*? ainsus*, N. and E. Asia; does not bite man (BACOT)], 14 per cent. were present in the Jullunder batch of 116 fleas. Out of 784 fleas from Bombay city, 49·8 per cent. were *astia*, 49·5 per cent. *cheopis*, the rest *brasiliensis*. In Poona, a colder climate than Bombay, 87 per cent. out of 466 fleas were *cheopis*, the remainder *brasiliensis*. The figures for Karachi are: 85 per cent. *cheopis*; the rest *astia*. Those of a small batch of fleas from Akyab, Burma, which has never suffered from plague, 98 per cent. *astia*.

[The only flea mentioned by Major Cragg not found in BACOT's list is *X. vigetus*, Rothschild, 1909 (*brasiliensis*, Jordan and Rothschild, 1908).]

For distribution of species for the U.S.A., see this *Bulletin*, Vol. 17, p. 389 (McCoy).

J. H. T. W.

TEISSIER (P.). **A propos d'un cas de peste bubonique.**—*Bull et Mém. Soc. Méd. Hôpit. de Paris.* 1921. Feb. 10. Vol. 45. No. 4. pp. 98-101.

—, TANON (L.), GASTINEL (P.) & REILLY (I.). **Valeur diagnostique de l'hémoculture dans la peste bubonique; fréquence de la bacillémie pesteuse.**—*Ibid.* Feb. 17. No. 5. pp. 136-138.

—, — & —. **Remarques sur l'épidémie de peste observée à l'hôpital Claude Bernard.**—*Ibid.* pp. 138-144.

GUINON & DE PFEFFEL. **Quelques aspects cliniques de la peste chez l'enfant.**—*Ibid.* Feb. 25 No. 6. pp. 215-220.

These papers have reference to the epidemic described in this *Bulletin*, Vol. 17, p. 392; the cases are of the same kind.

i. This was a case treated by M. Teissier, which, in spite of the fact that no bacilli were found by blood-culture, he believes to have been plague. The clinical symptoms were those of plague, with buboes in the right groin. On the skin of the abdomen were numerous marks of flea-bites.

ii. The writers found that even in mild cases of plague an early bacillaemia is nearly always present, but that where it is present in the

later stages of the disease prognosis is bad. They give the following table as a résumé of their work :—

Names.	Blood Culture.	Temperature	Day of illness.	Course of disease.
Des	+	40°	3rd day	Septicaemia. Death.
Ausch	+	40°	2nd day	Severe. Delirium. Cure.
Mart (woman) ..	—	40°	2nd day	Mild. Blood-culture not preserved after 48 hours.
M.	+	39°	4th day	Moderate.
C. (daughter) ..	+	39°	4th day	Mild.
C. (mother) ..	+	40°	4th day	Mild.
Ver.	+	38.5°	3rd day	Mild.
Qu.	+	41°	4th day	Septicaemia. Pulmonary and hepatic complications. Death.
B.	—	38°	15th day	Mild.
Paul	+	40°	9th day	Severe. Cure.
Del.	+	37.5°	12th day	Mild.
Pic.	—	39°	11th day	Bubo with extensive suppuration (associated with streptococci and staphylococci). Cure.

iii. The authors are mainly concerned with prophylaxis, to which was due the limited extension of the epidemic. They point out that : "The epidemic of plague which broke out in Paris a few months previously had, owing to prophylactic measures and especially to vaccinations, but a limited extension."

iv Practically presents the same features as described in the cases referred to on page 393 of Vol. 17 of this *Bulletin*.

J. H. T. W.

CINTRA (A. P. de Ulhôa). **Sobre a ultima epidemia de peste em S. Paulo.**

—*Bol. Soc. Med. e Cirurg. de S. Paulo.* Brazil. 1920 & 1921.

Oct.—Feb. Vol. 3. (2nd Ser.) Nos. 8–12. pp. 358–361.

Records particulars of a somewhat anomalous epidemic at first thought to be influenza pneumonica. The virulence of the infection, with rapid mortality, pointed to pneumonic plague. Examination of several fatal cases resulted in the finding of a Gram-negative germ resembling the cocco-bacillus of plague (Yersin). Experiments on guinea-pigs produced death in 3–6 days and, except for agglutination, the bacilli were like those of plague [possibly modified in pneumonic plague and more virulent than strains from bubonic plague]. About the same time MOTTA (I.) also described "plague-like bacilli," and SMILLIE (W. G.) found in rats dying in S. Paulo a variety of plague-bacillus. [See this *Bulletin*, Vol. 17, p. 398.]

J. H. T. W.

BOYD (Mark F.) & KEMMERER (T. W.). **Experience with Bubonic Plague (Human and Rodent) in Galveston, 1920.**—*Public Health Rep.* 1921. July 29. Vol. 36. No. 30. pp. 1754–1764. With 2 text figs.

These outbreaks in Galveston and other gulf ports have already been noticed [see this *Bulletin*, Vol. 17, pp. 387–9 (McCoy); pp. 389 & 394 (LEVY & McMICKEN; LEVY)].

This report contains nothing of further importance.

J. H. T. W.

ARAUJO (Eduardo). **Determinações cutaneas da peste. Estatística. Aspecto clinico. Pathogenia.** [Clinical and Pathological Aspects of Cutaneous Symptoms of Plague.]—*Brazil Medico*. 1921. July 16. Year 35. Vol. 2. No. 1. pp. 1-4.

Among 827 cases of plague admitted to the Monte Serrat hospital, 16 presented skin troubles of various kinds: pustular eruptions, phlyctenulae and bullae, etc. Yersin's bacillus was isolated [see this *Bulletin*, PATANE, Vol. 13, p. 326, and ALVARADO & BACA, Vol. 16, p. 46].

J. H. T. W.

SCHUT (H.). **Over eenige gevallen van longenpest.** [Some Cases of Pulmonary Plague.]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1921. Vol. 61. No. 1. pp. 65-70. With 4 charts.

Reports on five cases, all ending fatally. The author noted temporary improvement after administration of neosalvarsan (0.45 gm. on two consecutive days) and digalen (intramuscular injections of 1 cc. three times per day). He recommends the trial of this medication, combined with infusion of glucose solution into the veins to guard against possible heart failure.

W. J. Bais.

HARRISON (W. T.). **Report of a Human Plague Case in San Benito County, Calif.**—*Public Health Rep.* 1921. Sept. 9. Vol. 36. No. 36. pp. 2219-2220.

Though this is an ordinary plague case it presents points of interest and lessons for all who work in infected regions. The source of infection was an old squirrel plague focus in the Bitterwater Valley, San Benito County [see this *Bulletin*, Vol. 17, p. 387 (McCoy) and HARRISON, Vol. 16, p. 433].

An early diagnosis was made by Dr. O'BANNON, of Hollister, and large doses of anti-plague serum, obtained from F. J. Lackenbach, of San Francisco, were injected 68 hours after the onset. Owing to this prompt treatment the patient, a boy eight years old, recovered. This is the more satisfactory as the bacilli settled in the glands of the axilla and scapular region [see McCoy, *l.c.*; also MONZIOI and COLLIGNON, Vol. 16, p. 43].

Serous fluid from the oedematous area produced no bacilli; but when the swelling of the shoulder subsided Yersin's bacillus was cultivated from juice drawn from the enlarged lymphatic glands. Guinea-pigs inoculated intraperitoneally died within 48 hours.

J. H. T. W.

MONTFORT. **Un cas de peste autochtone en Nouvelle-Calédonie.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1921. Jan.-Feb.-Mar. Vol. 19. No. 1. pp. 72-75.

A case of bubonic plague, given with full details. Yersin's bacillus was found, and mice died with signs of murine plague, after inoculation with fluid from the inguinal bubo.

J. H. T. W.

KUNHARDT (J. C. G.) & CHITRE (G. D.). **An Experiment in the Eradication of Plague Infection carried out in the Poona and Adjacent Districts. First Report. (For the Period 1914-1916).**—*Indian Jl. Med. Res.* 1921. Jan. Vol. 8. No. 3. pp. 409-445. With 13 charts and 5 maps.

— & —. **Further Experiments in Plague Prevention carried out at Poona. Second Report. (For the period 1916-1918).**—*Ibid.* pp. 446-489.

These two long reports with useful charts and maps contain confirmation of much of the work presented by various writers to the Special Indian Science Congress in 1919 [see this *Bulletin*, Vol. 16, pp. 49-52].

J. H. T. W.

URIARTE (Leopoldo). **Profilaxis de la peste de Orient. Las ratas y los depósitos de mercaderías.**—*An. del Depart. Nac. Hig.* Buenos Aires. 1920. Sept.-Oct. Vol. 26. No. 5. pp. 293-318. With 4 text figs. and 20 illustrations.

This is a long and interesting article showing how grain may be stored and protected from rats, either out in the open, while waiting to be transferred by rail, or in warehouses. Similar methods of prevention and rat destruction have previously been noticed in this *Bulletin*, Vol. 16, pp. 49-52.

J. H. T. W.

KEILLOG (W. H.). **Epidemic of Pneumonic Plague.**—*Amer. Jl. Public Health.* Boston. 1920. July. Vol. 10. No. 7. p. 599. [Cited in the *Jl. Amer. Med. Assoc.* 1920. Aug. Vol. 75. No. 8. p. 563.]

Since this article was written the history of plague in the United States of America has been recorded by Dr. G. W. McCoy, and the epidemic of pneumonic plague is mentioned by him. [See this *Bulletin*, Vol. 17, p. 387.]

J. H. T. W.

BOINET (Édouard). **La peste de Marseille, en 1720 et 1721.**—*Bull. Acad. Méd.* 1921. July 5. Vol. 86. No. 27. pp. 10-15.

Historical, and gives dates of epidemics from 1383 to 1721; and gives a quotation from PETRONIUS pointing to a much earlier infection.

J. H. T. W.

CHOLERA.

CRENDIROPOULO (M.). **Assainissement général, prophylaxie. Rapport concernant des expériences sur les porteurs de vibrions cholériques.**

—*Bull. Office Internat. d'Hyg. Publique.* 1921. Mar. Vol. 13. No. 3. pp. 247-255.

The author is Director of the Bacteriological Laboratory, Alexandria, and his work is of importance, especially if compared with Professor G. SANARELLI'S experiments with guinea-pigs [see this *Bulletin*, Vol. 16, p. 438]. Rabbits were the subjects of Dr. Crendiropoulo's inoculations.

During the October session of the permanent Committee of the Office of International Hygiene a desire was expressed for further contributions on the cholera carrier. The period of retention of the cholera vibrio in the alimentary canal is of importance, not only as a guide to a rational and efficacious prophylaxis of the disease, but also for reasons of general value. The first step was to find out the best route for introduction of the infection and the amount necessary to render the animal a carrier. The technique was as follows:—After a certain dose of vibrios had been injected by the selected route, and after a given lapse of time, which varied from a few minutes to several months, the animal was pithed. The body was opened and, by means of cotton-wool tampons, separate specimens for culture were taken from the stomach, the duodenum, the jejunum, the ileum, the appendix, the caecum and the large gut. At the same time the bile, blood, urine, and often the liver, spleen, kidneys, suprarenal capsules and the lungs were found to be infected.

At first the author used vibrio No. 136 "El Tor" from a patient of 1913, but later preferred a more virulent strain from the stools of an Annamite patient, brought to Alexandria by the "Messageries Maritimes," in 1916.

Hypodermic route.—By this route, speaking generally, the vibrio does not penetrate the body; even in lethal doses the author only found vibrios in the appendix in one case out of 12. The animals died of intoxication, not of septicaemia.

Intraperitoneal route.—The vibrio killed the rabbits with certainty in a dose of 1/5 of the culture; but with a much smaller dose it was found in the alimentary canal. Injecting 1/15, one was sure to find it in the intestines, and often in the bile and the blood. Thus out of four rabbits inoculated with this dose, and killed at the end of four hours, he found the vibrio four times in the duodenum, ileum and appendix; three times in the blood, the bile, the caecum and the large intestine; and once only in the urine. In four others killed at the end of eight hours there were similar results. When the animals were killed at the end of 48 hours the chance of finding vibrios in such places was less; and at the end of three days no vibrios were found, although the author repeated his experiments three times. With smaller doses the results were uncertain, but sometimes the vibrio was isolated from the small gut, less often from the bile, and very rarely from the blood and other tissues, even during the first 24 hours. After that period results were negative.

Intravenous route.—Fifty-three rabbits were thus infected. The lethal dose was 1/30 of the culture; with 1/50 the greater number

survived ; 1/10 killed a rabbit in from 8 to 24 hours. Twelve rabbits receiving this dose gave positive culture results from all organs even when killed as early as 10 minutes after the injection. With 1/50 the positive results were less marked ; but six killed from 15 minutes to 24 hours later showed vibrios in the small intestines, bile, urine, spleen and liver. Once only were all cultures negative. Out of 10 rabbits that received only 1/100, all but one had eliminated the vibrios at the end of one hour.

By the stomach.—Vibrios introduced under normal conditions are killed and rarely pass into the intestine ; ordinarily the animals were left for 12 to 68 hours fasting before the vibrios were introduced by means of a tube. An entire culture made into emulsion with 10 cc. of physiological saline was given. The animals were killed in 30 minutes to two hours. Out of nine experiments seven were absolutely negative ; in two rabbits vibrios were present at the end of one hour ; one retained them alive in the stomach, the other in the appendix, cultures from other organs giving negative results. The fact remains that with rabbits the stomach forms an "almost insurmountable barrier to invasion of the body by *B. cholerae*."

The rectal route.—Cholera vibrios, even in small doses—1/50 to 1/100—pass into the various organs in 75 per cent. At the end of one hour no vibrios were found in 25 per cent.

J. H. Tull Walsh.

DOUGLAS (S. R.). **The Question of Serological Races of *V. cholerae* and the Relation of some Other Vibrios to this Species.**—*British Jl. Experim. Path.* 1921. Apr. Vol. 2. No. 2. pp. 49–57.

Major Douglas, I.M.S., has collected and tested the many varieties of vibrios which cause cholera. Most of them are geographical varieties, differing from type *V. cholerae* in agglutination reaction. Some cause haemolysis in blood culture media. The question of variety of strains has been examined in various records of epidemics noticed in this *Bulletin*, and in the Sectional Editor's "Critical Summary" (Vol. 18, p. 69).

The author's conclusions may be summarized as follows :—

(1) All strains of *V. cholerae* investigated belonged to one serological race, and, as these strains came from widely different sources, it is probable that there is only one serological race of *V. cholerae* [with varieties].

(2) The advantage of using emulsions made by formolizing broth cultures, as recommended by DREYER, when comparing the agglutinating properties of a series of strains of the same organism, is sharply brought out.

(3) After repeated subcultures, *V. paracholerae* A acquired the property of agglutinating with type serum. This property was not lost when virulence was restored by passage through guinea-pigs.

(4) Of "El Tor" vibrios, A 4 and 5 behaved as type *V. cholerae*. Strain 10 was like *V. paracholerae* A., *V. nasik*, *V. paracholerae* B, and the "El Tor" 35 differed from the type vibrio and from *V. paracholerae* A.

J. H. T. W.

NAAMÉ. **L'adrénaline dans le choléra.**—*Gaz. des Hôpit.* 1921. May 31. Vol. 94. No. 43. pp. 678–679.

The interesting part of this paper lies in the possible explanation of the uselessness of anticholera vaccine as a therapeutic agent. The author thinks that while the vaccinè, used as a prophylactic agent,

acts on an individual with healthy suprarenal bodies, sending a normal supply of adrenalin into the circulation, such supply is non-effective, if it ever reaches the blood, during an attack of cholera. The cholera patient tolerates large doses of adrenalin. M. A. MARIE has shown that, in guinea-pigs, adrenalin will neutralize a lethal dose of cholera vibrios, and SAJOURS writes that the endocrine secretions in the blood favour the production of germicide substances and antitoxins. They also encourage phagocytosis (*Presse Méd.*, 1912, Jan. 27). VIOLLE (Le Choléra, pp. 170 and 425) writes :—

“ In 1911 Naamé began a new treatment for cholera ; he treated his patients with adrenalin, and obtained great success. Doctors in India, and in Italy especially, applied this method and were equally satisfied With large intravenous injections of saline, to which adrenalin is added, the algid stage of cholera is, at the present day, best controlled.”

[For the effect of cholera toxin on the suprarenal secretion of rabbits, see this *Bulletin*, Vol. 6, p. 41. DÉMÉTRESCU.]

J. H. T. W.

MACKIE (F. P.) & GUPTA (J. C.). **Statistics of the Treatment of Cholera.**
— *Indian Med. Gaz.* 1921. June. Vol. 56. No. 6. pp. 201-203.

The professor of pathology and the house-surgeon of the Medical College Hospital, Calcutta, following the treatment inaugurated by Sir Leonard ROGERS, give an analysis of cholera statistics for June to December, 1920, as set out in Table II :—

TABLE II.

Months.	Type of Disease.	Per cent. of Deaths.	Deaths	Recoveries.	Totals.
June	{ Mild .. ..	..	Nil	10	10
	{ Moderate .. ..	..	3	35	38
	{ Severe .. ..	..	27	6	33
	Totals	37	30	51	81
July	{ Mild .. ..	..	Nil	16	16
	{ Moderate .. ..	..	4	39	43
	{ Severe .. ..	..	10	13	23
	Totals	17	14	68	82
August	{ Mild .. ..	..	Nil	[1]	1
	{ Moderate .. ..	..	Nil	[9]	9
	{ Severe .. ..	..	1	[3]	4
	Totals	7	1	13	14
September	{ Mild .. ..	..	Nil	2	2
	{ Moderate .. ..	..	1	4	5
	{ Severe .. ..	..	3	7	10
	Totals	23	4	13	17

TABLE II.—*continued.*

Months.	Type of Disease.	Per cent. of Deaths.	Deaths.	Recoveries.	Totals.
October	Mild .. ..	..	Nil	5	5
	Moderate .. ..	..	Nil	7	7
	Severe .. ..	..	3	4	7
	Totals ..	16	3	16	19
November	Mild .. ..	..	Nil	7	7
	Moderate .. ..	..	2	25	27
	Severe .. ..	..	10	7	17
	Totals ..	23	12	39	51
December	Mild .. ..	..	Nil	3	3
	Moderate .. ..	..	Nil	21	21
	Severe .. ..	..	Nil	10	10
	Totals ..	..	Nil	34	34
		21	64	234	298

The causes of death were :—

Suppression of urine	25
Cardiac failure	29
Abortion	2
Collapse	10
	—
	64
	—

Tables V and VI also give useful information concerning the specific gravity of the blood and the amount of saline injected :—

TABLE V.

Sp. Gravity.	Totals.	Deaths.	Recoveries.	Sp. Gravity.	Totals.	Deaths.	Recoveries.
Over 1070..	7	1	6	1062..	28	4	24
1070..	5	2	3	1061..	23	5	18
1069..	15	3	12	1060..	11	2	9
1068..	21	10	11	1059..	3	0	3
1067..	9	1	8	1058..	20	1	19
1066..	21	4	17	1057..	8	0	8
1065..	9	1	8	1056..	15	2	13
1064..	15	3	12	1055..	2	0	2
1063..	30	6	24	Under 1055..	17	1	16

TABLE VI.

No. of Pints.	Cases.		Deaths.	Recoveries.
	Intravenous.	Subcutaneous.		
Over 10 pints.. ..	43	Nil	21	22
9 " " " " " "	12	Nil	3	9
8 " " " " " "	13	Nil	Nil	13
7 " " " " " "	6	Nil	1	5
6 " " " " " "	23	1	2	21
5 " " " " " "	22	Nil	4	18
4 " " " " " "	31	1	4	27
3 " " " " " "	32	6	5	27
2 " " " " " "	33	7	2	31
1 " " " " " "	24	27	Nil	24
Nil " " " " " "	Nil	Nil	Nil	32

J. H. T. W.

WALKER (Ronald R.). **The Action and Uses of Kaolin in the Treatment of Asiatic Cholera.**—*Lancet*. 1921. Aug. 6. pp. 273-276.

Refers to work done by Louis H. BRAAFLADT [see this *Bulletin*, Vol. 16, p. 434]. Dr. Walker used kaolin during an epidemic in Foochow (1919), obtaining the material from "the famous Blanc de Chine beds" in the Hing Hwa district.

"A large supply of half-and-half suspension was placed near the patient, and the nurse was told to encourage the patient to take as much as possible In all cases food was withheld for 18 to 24 hours, then rice water was allowed, and later milk and rice water. In all cases rectal lavage was done with kaolin solution thickened until it would comfortably pass through the rectal tube If the condition of the patient was precarious on arrival at hospital, it was found that subcutaneous bilateral infusion usually restored the patient sufficiently to take kaolin by the mouth. In desperate cases hypertonic salt solution was given intravenously (ROGERS), but no such large quantities as we used before the introduction of the kaolin treatment . . . "

The author carried out some experiments in which rabbits were fed with kaolin, which after 18 hours was found adhering to the walls of the stomach and intestines.

J. H. T. W.

FLU (P. C.). **Onderzoekingen over den levensduur van cholera-vibrionen en typhusbakteriën in septic tanks te Batavia.**

[Researches on the Duration of Life of *Vibrio cholerae* and Typhoid Bacteria in Septic Tanks in Batavia.]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1921. Vol. 61. No. 3. pp. 288-293.

The cholera vibrios died sooner in the septic tanks than did the typhoid bacilli inoculated into them. In one series of experiments (Kampong Pintoe Besie) vibrios had disappeared at the end of 24 hours, while typhoid bacilli were present up to the end of the fifth day; in another (Kampong Kebon Djeroek) the vibrios were still living at the end of 24 hours, the typhoid bacilli at the end of 72 hours.

J. H. T. W.

FLU (P. C.). **Onderzoekingen over den levensduur van cholera-vibrionen en typhusbacteriën in zeewater.** [Researches on the Duration of Life of *Vibrio cholerae* and Typhoid Bacteria in Sea Water.]—*Geneesk. Tijdschr. v. Nederl.-Indië*. 1921. Vol. 61. No. 3. pp. 307-316.

The different opinions expressed by authors on this subject are ascribed by the author to differences in climate and sort of water, differences in quantities and strains of cholera vibrios used, and in methods employed in detecting the germs again after the artificial pollution of the sea water. The author made his experiments at Tandjong Priok, the port of Batavia. For the technic used by him the original should be seen. He could not demonstrate any preserving action of sea water on the cholera vibrio; this, and the *Bacillus typhosus* as well, disappeared from infected sea water within four days. Yet this period necessitates precaution against sea water that may be freshly contaminated, such as water of ports in times of epidemics.

W. J. Bais.

FUKUHARA (Y.). **Die weitere Anwendung unserer neuen Methode zur Wertbestimmung der antiinfektiösen Cholera- sowie Paratyphus-sera.** [Further Application of a New Method of Estimating the Value of Anti-Cholera and Anti-Paratyphoid Sera.]—*Cent. f. Bakt.* 1. Abt. Orig. 1921. July 8. Vol. 86. No. 6. pp. 450-458.

The cholera serum is compared with a standard serum, the minimum lethal dose of which is known for the animal under experiment. The serum to be tested is mixed with the standard serum in various proportions and its effect on the animal observed. If, for example, the tested serum in such a mixture producing the death of the animal in 24 hours is 0.001 cc., then that serum contains 1,000 immunity units in 1 cc.

J. H. T. W.

SNAPPER (J.). **Die Zersetzung von Blut und Blutfarbstoff durch Cholera- und Tor-Vibrionen.** [Decomposition of Blood and Haemoglobin by Cholera and "El Tor" Vibrios in Blood Cultures.]—*Cent. f. Bakt.* 1. Abt. Orig. 1921. June 28 Vol. 86. No. 5. pp. 396-405.

Professor Snapper concludes from his experiments :—

1. That "El Tor" vibrios can be found in stools of persons not suffering from true cholera.
2. "El Tor" vibrios give rise to haemolysis in an emulsion of goat's blood corpuscles; true cholera vibrios do not.

[It is generally recognized that the "El Tor" vibrio is a variety and near relative of the type cholera vibrio. That "El Tor" causes haemolysis is also well known.]

J. H. T. W.

PERGOLA (M.). **Valore dell'arbutina nell'identificazione dei vibrioni.** [Value of Arbutin in Identification of Vibrios.]—*Ann. d'Igiene*. 1921. May. Vol. 31. No. 5. pp. 265-271.

Using culture media of ordinary broth, to which arbutin was added in varying amounts, Professor Pergola arranges his vibrios according to their power of attacking the arbutin. Typical "commas" act strongly.

J. H. T. W.

MALECŃSKI (J.) Cholera azjatycka wśród ludności cywilnej miasta stołecz. Warszawy w roku 1920. (Sprawozdanie wydziału zdrowia publicznego miasta stol. Warszawy.)—Cholera asiatique parmi la population civile à Varsovie en 1920. (Compte-rendu du Bureau municipal de Santé de la ville de Varsovie.)—*Przeegl. Epidemiol.* Warsaw. 1921. Vol. 1. No. 4. pp. 384–385. [French Summary p. 386.]

Merely notes occurrence of infection. Number of cases 22; deaths 15, or 68 per cent.; 5,705 persons were vaccinated.

J. H. T. W.

SCURVY.

BASSETT-SMITH (Percy W.). **Further Experiments on the Preservation of Lemon Juice and Prevention of Scurvy.**—*Lancet*. 1921. Aug. 13. pp. 321–322. With 2 charts in text.

Previous papers on this subject by Sir Percy Bassett-Smith were noticed in this *Bulletin*, Vol. 16, p. 402, and Vol. 17, p. 194; in the present paper the author records the results of testing his tablets after prolonged storage.

"I have therefore tested healthy young guinea-pigs of about 300 gm. weight with tablets [prepared from fresh lemon juice in vacuo without heat] which had been stored in the laboratory at room temperature for over twelve months. The basal diet consisted of ships' biscuit, bran, oats, casein, salt and lime-water, with 60 cc. daily of milk so heated as to destroy any antiscorbutic vitamin. Each day one-fifth of a tablet was given, equivalent to 4 cc. of fresh lemon juice. The animals under experiment have over a period of 70 days showed no signs of scurvy; they are bright and healthy, and have steadily gained weight, as shown by the curves in the annexed chart. Control animals, without antiscorbutic factors, show signs of scurvy about the twenty-first day and then rapidly lose weight."

It was shown in the last paper that short periods of heating, even at boiling temperature, only slightly reduce the antiscorbutic value of lemon-juice,* and it is suggested that the tablets could be produced in commerce by a process similar to that used in the preparation of Nestlé's condensed sweetened milk, which retains most of its vitamins.

A sample of lemon-juice extracted from the whole lemon at Messina was tested and found to be worthless when used in quantities up to 8 cc. daily; it had not been specially protected from heat due to climate and storage. The same was the case with a Messina sample preserved with potassium metabisulphate.

Tinned tomatoes were tried and were well taken by the guinea-pigs; the results of GIVEN and McCLUGAGE, and of HESS, were confirmed [see this *Bulletin*, Vol. 18, p. 56]. It was effective in 4 cc. daily doses whether as prophylactic or after onset of scurvy symptoms. Charts illustrate the first two experiments.

A. G. B.

VEDDER (Edward B.). **The Etiology of Scurvy.**—*Milit. Surgeon*. 1921. Aug. Vol. 49. No. 2. pp. 133–150. With 9 charts.

The author draws attention to the variation in results caused by using different kinds of animals in experiments—rats being, for instance, little susceptible to scurvy; guinea-pigs much more so. He discusses the various terms used for the active preventive factors, and introduces the name "Vitaliment" as being more appropriate than "Vitamin," accessory food factor, or water soluble B and C and fat-soluble A. He describes a fresh series of experiments on guinea-pigs, the results of which are given in the following summary:—

"1. Scurvy can be produced in guinea-pigs with regularity by feeding a liberal and varied diet consisting of oats, mixed scratch feed, bread, sterilized milk, and hay.

* In the last sentence of the summary of Sir Percy Bassett-Smith's last contribution [Vol. 17, p. 194] the word *less* was unfortunately substituted for *more*.

" 2. Scurvy may be prevented by the daily addition of 5 gms. of green grass or 5 cc. of filtered orange, lemon, or grapefruit juice, and cured by larger amounts.

" 3. The antiscorbutic vitaliment is soluble in water, absolute alcohol, acetone, and commercial ethyl acetate.

" 4. The antiscorbutic vitaliment cannot be extracted from the partially dried juice by ether, chloroform or carbon tetrachloride.

" 5. The antiscorbutic vitaliment differs from the beriberi-preventing vitaliment in the following particulars :—

" (a) The antineuritic vitaliment is adsorbed by finely powdered animal charcoal. The antiscorbutic vitaliment is not so adsorbed. (Harden and Zilva—confirmed by the writer.)

" (b) The antineuritic vitaliment is precipitated by phosphotungstic acid. The antiscorbutic vitaliment is not so precipitated, but is probably destroyed.

" (c) The antineuritic vitaliment is a nitrogenous base. The antiscorbutic vitaliment is apparently non-nitrogenous.

" 6. By means of the solvents mentioned above a purified extract has been prepared which is suitable for further chemical study."

P. W. Bassett-Smith.

i. ORENSTEIN (A. J.). **The Etiology of Scurvy.**—*Proc. [Transvaal] Mine Med. Officers' Assoc.* 1921. Apr. Vol. 1. No. 1. pp. 2-6.

ii. DONALDSON. **The Clinical Side of Scurvy in the Mine Native Labourer.**—*Ibid.* p. 6-9. (Discussion pp. 10-11.)

i. In 1920 the number of cases of scurvy diagnosed in the Rand Mines was greater than that of the total of the preceding five years. The various etiological theories are discussed, but nothing new is brought forward.

ii. The general clinical symptoms are described. Diagnosis was difficult in some of the more acute forms found in young natives, with extensive blood extravasations under the skin and into joints or serous cavities. The respiratory organs were less implicated than is usually the case in Europeans, and the central nervous system was rarely affected. Haematuria is common and periarticular extravasations are frequent, the latter cases often being sent to hospital as rheumatism. The late effects of scurvy, such as contractures and deformities, are now uncommon, as the cases generally come earlier under treatment. To show the prevalence of the disease it was stated that, in 1919-20, 200 cases of active scurvy were treated in one hospital, and one third of these occurred within the first three months of joining the mines. The importance of supplying the workers with a rational antiscurvy diet was evident, and oranges and lemons were recommended rather than a preparation called "Lemnos," which was often advocated. A supply of sour milk and sauerkraut would be useful. Dr. WATKINS drew attention to the over-cooking of the meat ration, and stated that no vegetables should be boiled; they *ought to be steamed*. The value of Kaffir beer was uncertain, as its preparation differed in different mine areas. There was no doubt that scurvy predisposed to every kind of bacterial invasion, and it was possible to show that the fall of pneumonia in the mines ran parallel with the fall in scurvy cases.

P. W. B-S.

KOCH (Walter). **Der jetzige Stand der Pathologie und Pathogenese der Barlowschen Krankheit und des Skorbut.** [The Present Position with regard to the Pathology and Pathogenesis of Barlow's Disease and Scurvy.]—*Deut. Med. Woch.* 1921. June 30. Vol. 47. No. 26. pp. 749-750.

The author has placed before the reader very clearly the subject treated, but gives no new facts. He considers that Barlow's disease and the scurvy of infants and adults are identical diseases, the manifestations of which change with the age of the patient. He describes the pathological characters which are found, particularly the hæmorrhages, and the epiphysial changes in infants, to which are added in older children ulcerative stomatitis and carious teeth. Insufficient quantity of food leads to hunger oedema, whereas scurvy is produced by food defective in quality. Sucklings appear to be born with a store of vitamins, as scurvy does not occur before the age of six months. He states that though the various antiscorbutic foods act best when taken in the raw state, they do not lose much in strength by ordinary cooking, but are greatly reduced by long heating, drying, or prolonged storing. He condemns sterilized and prepared milk or artificial foods for sucklings. A food defective in quality predisposes to scurvy in proportion to the rate of growth in the children. Constitutional peculiarities and infective diseases predispose to and favour the onset of scurvy. Our present knowledge has rendered the diagnosis of the disease more easy, and no disease can now be more readily cured, though we have not yet discovered finally the etiological factors.

P. W. B-S.

COMBY (J.). **Douze nouveaux cas de scorbut infantile.**—*Bull. et Mém. Soc. Méd. Hôpit. de Paris.* 1921. Mar 3. Vol. 45. No. 7. pp. 288-293. (Discussion, pp. 293-296.)

After drawing attention to the fact that owing to the shortage of fresh milk and ignorance or negligence of the causes, infantile scurvy has much increased in France, the author describes the clinical characters of two cases, and states that by simple antiscorbutic treatment every one of the 72 seen by him had been cured, even when of long duration and severe character. Painful pseudo-paraplegia was recognized in 68 cases, hæmorrhagic gums in 16 (22 per cent.), seven times in infants who had not erupted any teeth. When the deficiency food was replaced by freshly boiled milk, with orange juice or sweetened lemon juice, rapid improvement was generally noticed, and for prophylaxis, even with the use of sterilized, condensed or dry milk, the addition of fresh juice was efficacious.

In the discussion, M. VARIOT condemned artificial infant milk foods, but said that with sweetened condensed milks he had very good results, in great contrast to those following the use of unsweetened milk. From clinical observations he found the effect of "dried" milk on infants was deplorable; it was badly tolerated and badly utilized, and often gave rise to gastro-intestinal trouble; though perhaps useful for adults, it was not a good food for infants. LOUIS MARTIN and the author spoke favourably of dried milk, but no preserved milk could replace efficiently raw cows' or mothers' milk.

P. W. B-S

FABER (Harold K.). **Infantile Scurvy following the Use of Raw Certified Milk.**—*Amer. Jl. Diseases of Children*. Chicago. 1921. Apl. Vol. 21. No. 4. pp. 401-405.

It is stated that infants may develop scurvy when brought up on a diet of raw milk. The author reports the case of a child which had been fed exclusively on certified raw milk and at the age of six months developed typical scurvy. It recovered completely when a diet rich in antiscorbutics was supplied. It is possible that the amount of milk given was too small, or that something was added which destroyed the antiscorbutic present in the milk, for example, sodium citrate, which had been given in small quantities. Though this theory was not conclusively proved, the author suggests that the use of sodium citrate in infant feeding over long periods should be provisionally regarded as dangerous.

P. W. B-S.

McCLELLAND (R. S.). **A Case of Scurvy.**—*Lancet*. 1921. Sept. 17. p. 608.

The case reported was that of a collier, aged 40, from North Wales, who showed typical symptoms of scurvy. It was disclosed that he lived almost entirely on bacon, bread and tea, and disliked vegetables, which he called pig's food.

P. W. B-S.

MACKLIN (A. H.) & HUSSEY (L. D. A.). **Scurvy: a System of Prevention for a Polar Expedition based on Present-day Knowledge.**—*Lancet*. 1921. Aug. 13. pp. 322-326.

An interesting and carefully thought-out description of the practical means of defending an expeditionary party from scurvy in Polar regions.

P. W. B-S.

GODLEWSKI (Henri). **Carence partielle et préscorbut.**—*Presse Med*. 1921. Aug. 27. No. 69. pp. 682-683.

The author states that acute cases of scurvy are rare in comparison with those grouped under the name of pre-scurvy anaemia, which condition is caused by a partial deficiency in the food supplied, and easily passes into confirmed scurvy if the dietetic error is not corrected. This condition of chronic scurvy, as described by HOLST and FROLICH, WEILL and MOURIQUAND, is compatible with a state of health generally satisfactory but very unstable. In the scorbutic anaemia, with the development of the osseous changes the number of red cells becomes reduced as low as 2,500,000 per cmm. and normoblasts appear. This is a condition frequently found in infants badly dieted, who have intestinal symptoms commonly ascribed to teething, and a further stage is Barlow's disease. The author emphasizes the fact that for cure it is necessary to give, not traces, but full doses of the vitamin-containing substance both to animals and man. In children the loss of vitamin has been of long duration, and marked changes of metabolic activity have been induced, so that an acute condition is readily brought about by accidental causes. "Traces of the living substance in the food of the infant serve to keep it alive, but in a state of anaemia and pre-scurvy. For a normal growing state it is necessary that not only

traces, but a daily ration of the essential substance be given, which is probably required for nuclear formation." For treatment thyroid extract, fresh vegetables, "eau de vegetation," milk, fresh fruits and meat are useful. He quotes TROUSSEAU, who gave his little son, aged six months, 500 gms. of pounded meat every day for scurvy diarrhoea, with success; the author recommends about 25 gms. under the same conditions.

P. W. B-S.

GERSTENBERGER (H. J.). **Malt Soup Extract as an Anti-Scorbutic.**—*Amer. Jl. Diseases of Children*. Chicago. 1921. Apr. Vol. 21. No. 4. pp. 315-326.

It has generally been considered, and HESS has reported, that KELLER'S malt soup—a mixture which contains 100 gms. of so-called malt soup extract—is a diet that induces scurvy. For certain reasons infants were fed on this preparation, and instead of getting worse, they showed marked evidences of improvement. This was attributed to the brand used having been made from barley of the proper age and state of germination, containing a high amount of potential antiscorbutic material. The author suggests that all malt soup extract could be so manufactured as to ensure a large antiscorbutic value, in which case it could be added to the list of regular and trustworthy antiscorbutics. Three other cases were, however, later treated with the same brand, with less satisfactory results.

P. W. B-S.

FINDLAY (G. Marshall). **A Note on Experimental Scurvy in the Rabbit and on the Effects of Ante-Natal Nutrition.**—*Jl. Path. & Bact.* 1921. Oct. Vol. 24. No. 4. pp. 454-455. With 1 plate.

The animals that have shown susceptibility to experimental scurvy are monkeys, pigs and guinea-pigs. The author found that rabbits, too, were, under certain conditions, affected with symptoms and signs similar to those in guinea-pigs. Six rabbits, three males and three females, were kept on a diet of oats, wheat-bran and water. Two of these crossed during the experiment gave birth to seven young, which were all born dead and showed signs of scurvy, namely, swollen knee joints, haemorrhage in the tissues round the joints, enlarged costo-chondral junctions, etc. No signs of scurvy were found in the adult animals even up to the sixty-third day, though there was considerable loss of weight; when placed on swede juice the animals gained weight and improved in condition. The author concludes that (1) rabbits deprived of vitamin C gradually lose weight and eventually die; (2) the addition of vitamin C brings about a cure; (3) pregnant rabbits deprived of vitamin C throughout the period of gestation produce young with marked scurvy signs, the mothers remaining apparently healthy.

P. W. B-S.

FINDLAY (George Marshall). **The Effects of an Unbalanced Diet in the Production of Guinea-Pig Scurvy.**—*Biochemical Jl.* 1921. Vol. 15. No. 3. pp. 355-357.

The experiments were instituted to see if an excess of sugars, fats or proteins in the diets of guinea-pigs deprived of antiscorbutic

vitamin would hasten the onset of the disease, as has been found in the case of vitamin B deficiency. Twenty-four animals were used, in four groups of six in each, and tables of weights, etc. are given. It is specially noted that the biological appearances found in the bones and joints of the animals which received the extra ration of cod-liver oil were identical with those met with in other cases of guinea-pig scurvy, showing that the want of vitamin A is in no way responsible for the lesions which occur in experimental scurvy. From the experiments they conclude that an excess of either fat, protein or carbohydrate in a diet deficient in vitamin C does not, in guinea-pigs, hasten the onset of the symptoms, but that death is slightly accelerated when there is an excess of protein or carbohydrate, and the loss of weight is greatly increased in scurvy guinea-pigs when there is an excess of carbohydrate.

P. W. B-S.

TOZER (Frances M.). **The Effect on the Guinea-Pig of Deprivation of Vitamin A and of the Anti-Scorbutic Factor, with Special Reference to the Condition of the Costo-Chondral Junctions of the Ribs.**—*Jl. Path. & Bact.* 1921. July. Vol. 24. No. 3. pp. 306-325. With 2 plates, 5 text figs. and 2 charts.

The histological changes in the guinea-pigs used in the prolonged experimental work carried out at the Lister Institute with regard to scurvy, some of which have been already published, are here described in detail. The author points out that in the early experiments by HOLST, and at the Lister Institute, the importance of vitamin A was not fully appreciated, and its absence caused erroneous conclusions to be drawn. The experiments here detailed are divided into four groups:—

1. Normal controls, namely, animals fed on the basal diet, plus vitamin A, B and C.
2. Animals deprived of antiscorbutic factor only.
3. Animals deprived of A only.
4. Animals deprived of A and C vitamin.

The changes of the costo-chondral joints under each condition are described and figured, and the general course of the illness produced is clearly described. In No. 2 the haemorrhages and disorganization of the joints are very rapid and marked, and death occurs within a month. In No. 3 the course is not so rapid, haemorrhages are not present, the joint degeneration is less marked, but medullary changes are more in evidence, and death is less rapid. In No. 4 the appearances were much the same as those of scurvy alone. These experiments show that unless the animal is protected against the effects of insufficient vitamin A, the results will be complicated and the diagnosis may be incorrect. The clinical picture in guinea-pigs deprived of the antiscorbutic factor alone is graver than when vitamin A alone is lacking. Simultaneous deprivation of both these accessory factors does not seem to accelerate the onset of scurvy symptoms, but after these appear they mask the less severe symptoms caused by the absence of vitamin A, so that the disease appears to be scurvy. Histological appearances at the costo-chondral junction resembling

those of rickets have been observed in animals deprived of vitamin A, and in mild and acute scurvy complicated by a deficiency of vitamin A. The two beautiful plates show clearly the conditions produced.

P. W. B-S.

MOREL (A.), MOURIQUAND (G.), MICHEL (P.) & THÉVENON (L.). **Sur l'absence de troubles électifs du métabolisme du calcium osseux dans le scorbut expérimental.**—*C.R. Soc. Biol.* 1921. July 23. Vol. 85. No. 27. pp. 469-470.

The remarkable changes in the bones of guinea-pigs suffering from experimental scurvy led the authors to examine for marked evidences of decalcification and loss of salts. They found in normal animals for 100 parts of dry bone 56·37 ash and 25·9 lime, in animals with clinical and anatomical scurvy 58·7 ash and 26·9 lime, in animals which died of intestinal intoxication without scurvy lesions 59·21 ash and 26·8 lime; in animals which died from simple inanition the ash was 51·4 and the lime 25·7. These results indicate that the alteration of the bones in experimental scurvy is not due to the loss of mineral material and especially lime. Further work is being carried out, including histological examinations. [These have been described and well figured by TOZER of the Lister Institute, London: see above.]

P. W. B-S.

FINDLAY (G. Marshall). **The Blood and Blood-Vessels in Guinea-Pig Scurvy.**—*Jl. Path. & Bact.* 1921. Oct. Vol. 24. No. 4. pp. 446-453.

In this investigation particular attention was directed to the changes in the blood and vascular system. Thirty guinea-pigs of 250 to 400 gms. were used: 25 were placed on a diet of bran and oats with 60 cc. of autoclaved milk, with the addition in the case of the five controls of 5 cc. of fresh orange juice. Twelve of the experimental animals were killed at intervals of 48 hours, commencing on the second day, while 12 were allowed to develop well-marked scurvy symptoms and were then killed—six in the pre-coma and six in the coma stage. Cultures from the heart blood were negative except in one case. Blood counts from the ear and heart blood taken at the same time [it is not stated whether this was before or after death] showed considerable variations demonstrating marked capillary stasis something like that seen in cases of shock; eventually the stagnation leads to insufficient oxygenation of the tissues and then death. No marked erythroblastic reaction was found in the bone marrow. The chief pathological changes in the vascular system were:—(1) Degenerative changes in the lining endothelium; (2) Extreme congestion; (3) Fine oedema of the tissues around the vessels; (4) Haemorrhagic areas in close relationship to the capillaries. Fatty degeneration of the heart muscles was not found, but haemorrhagic infiltration of the heart was seen in five cases. The earliest haemorrhage was found microscopically after 12 days in the muscles of the back of both knees; by the 14th day they were visible to the naked eye. The internal organs showed haemorrhagic foci most commonly in the kidney, bladder, intestine, liver, adrenals, bone marrow, and spleen; in some of the animals at the time of death the haemorrhages were very small and few in number. Haemorrhage into the cortex of the adrenals was found only in four animals but subcapsular haemorrhages were common.

In adult animals haemorrhages into the central nervous system were never observed, though they were frequent in the meninges. In guinea-pigs the disease is acute from a total deprivation of the vitamin C, whereas in man the deficiency is very rarely complete and the disease is much more chronic [as has lately been emphasized by many observers]. In one instance the guinea-pig when killed had in utero four young between 50–60 days old; these all showed well-marked scurvy lesions, and in one there were extensive haemorrhages in the central nervous system.

P. W. B-S.

HESS (Alfred F.), UNGER (L. J.) & SUPPLEE (G. C.). **Relation of Fodder to the Anti-Scorbutic Potency and Salt Content of Milk.**—Reprinted from *Jl. Biol. Chem.* 1920. Dec. Vol. 45. No. 1. pp. 229–235. With 2 charts in text.

Five cows were fed for 21 days upon an ample diet, except that it was deficient in antiscorbutic vitamin. Samples of the milk, which had fallen off in quantity, were taken for further examination, the cows were then kept for three weeks on pasture, and samples were again taken from the five. The samples were dried by the Just Hatmaker process and guinea-pigs were simultaneously fed with the two kinds, using a daily ration equal to 80 cc. of the fresh milk. Those fed on the dry fodder milk developed scurvy in about 21 days, and died within 65 days; the animals on the pasture milk remained alive up to the 120th day, though two showed slight scurvy signs [number of guinea-pigs used not stated]. It would appear that the antiscorbutic taken in with the food is rapidly secreted in the milk, and that no storage in the body takes place, also that dry fodder contains but little antiscorbutic vitamin. A chemical examination of the milk showed that in the two samples the fats, protein, and sugar percentages were very similar, but that the calcium, phosphate, and citric acid content was much higher in the pasture milk than in the dry fodder milk.

P. W. B-S.

MOURIQUAND (G.) & MICHEL (P). **Le jus de citron stérilisé est-il anti-scorbutique ?**—*C.R. Soc. Biol.* 1921. July 23. Vol. 85. No. 27. pp. 470–472.

HOLST and FRÖLICH found that lemon-juice heated to 110° C. did not lose its antiscorbutic power, being stabilized by the presence of citric acid. The authors found, in their experiments, that the juice heated for an hour at 120° C. when given to guinea-pigs in doses of 5–10 cc. did not prevent scurvy, but delayed its onset for a period of 85–110 days, causing a chronic and peculiar type of disease, which underwent, sometimes, spontaneous cure [see this *Bulletin*, Vol. 18, p. 60.] From their experience they conclude that sterilization by heat does reduce the antiscorbutic power of the juice. The experimental scurvy thus produced only appears after a prolonged period and more nearly resembles the human form; it is necessary to watch the animals for a period of 150 days, the failure to do which has led many experimenters to erroneous conclusions, and explains some discordant results. [This applies to conditions of hypovitaminosis, not to experiments where the vitamin is completely withheld.]

P. W. B-S.

- i. ELLIS (N. R.), STEENBOCK (H.) & HART (E. B.). **The Stability of Anti-Scorbutic Vitamine and its Behaviour to Various Treatments.**—*Jl. Biol. Chem.* 1921. Apr. Vol. 46. No. 2. pp. 367–380.
- ii. HART (E. B.), STEENBOCK (H.) & ELLIS (N. R.). **Anti-Scorbutic Potency of Milk Powders.**—*Ibid.* p. 309.

i. In continuation of previous experiments the authors working with guinea-pigs found that desiccation of cabbage in an atmosphere of CO_2 for 36 hours at 65°C . did not prevent the destruction of the antiscorbutic vitamin. This is contrary to the results reported by ZILVA when boiling lemon-juice in an atmosphere of CO_2 [this *Bulletin*, Vol. 18, p. 60]. They found that in the making of sauerkraut from cabbage, and silage from corn, fermentation processes caused a destruction of the antiscorbutic factor. The vitamin was not removed from orange-juice by ether or by aeration, but was destroyed by oxidizing agents such as hydrogen peroxide and potassium permanganate. The reducing action of molecular hydrogen had no effect, but a certain amount was lost by passage through blood charcoal or a Chamberlain filter. Thirteen illustrative charts are given of the weight curves.

ii. Three methods of drying milk are commonly used in America : (1) the Merrell-Soule or spray process ; (2) a spray process used in the California Central Creameries, in which the milk is not condensed before being dried ; and (3) the Just process of drying the milk on heated rollers. These products were used for the experiments, guinea-pigs being employed. Descriptive weight charts of the animals are given. It is recognized that milk powders may vary in their antiscorbutic properties, depending upon, firstly, the initial quantity of the vitamin in the milk, which is influenced by the feeding of the cows as reported by HESS, UNGER, SUPPLEE and others ; secondly, upon the method employed in drying, the spray process being more destructive to the antiscorbutic vitamin than the Just process. They point out that this does not condemn the milk powders as food, but it should be recognized that when used as the sole source for infant feeding they must be supplemented by some substance containing the necessary vitamin, the only possible exception being powders prepared by the Just process from summer milk, or from cows especially fed.

P. W. B-S.

ZILVA (Sylvester Solomon) & MIURA (Masataro). **The Differential Dialysis of the Antineuritic and Antiscorbutic Factors.**—*Biochemical Jl.* 1921. Vol. 15. No. 3. pp. 422–426. With 2 charts.

It has been shown by EIJKMAN, HOLST, and FRÖLICH that the accessory food factors for beriberi and scurvy are dialysable. The authors prepared collodion thimbles, and their permeability was determined by means of chemicals, mostly dyes. Filtered autolysed yeast was used for the antineuritic factor, and de-acidified filtered lemon-juice for the antiscorbutic. The actions were similar, both practically failed to pass through the thimbles which had been soaked for 24 hours in 90 per cent. alcohol, but completely through the 95 per cent. one. A rat was used for the beriberi, and a guinea-pig

for the scurvy experiments. The permeability of the colloidal membrane that allowed the diffusion of the "factors" was the same as that which permitted the passage of methylene blue, neutral red, and safranine. It is suggested that the active molecules of the factors may be of a semi-colloid nature and further investigations are suggested.

[It is rather remarkable that the guinea-pig on 7 cc. of dialysed lemon-juice should show scurvy symptoms in so short a time as five days, seeing that an observation-period so much longer is required for symptoms in the other animals.]

P. W. B-S.

DIETETIC DEFICIENCY DISEASE.

HOPKINS (F. Gowland). **The Huxley Lecture on Recent Advances in Science in their Relation to Practical Medicine and the Nutritional Requirements of the Body.** Delivered at Charing Cross Hospital Medical School (University of London), on November 24th, 1920.—*Lancet*. 1921. Jan. 1. pp. 1-7.

Professor Hopkins begins his remarks with a discussion of what may be termed "the other side." He pays high tribute to the great workers in the science of Calorimetry, but adds that results obtained from this science are insufficient in practical dietetics. In this connection Professor Hopkins gives the "text" of his lecture. "An animal may receive, digest, absorb, and, in a sense, fully metabolize a diet consisting of all the recognized basal foodstuffs. It may be taking these foodstuffs in quantities sufficient, or more than sufficient, to supply all its needs for energy. And yet its nutrition may be so abnormal that neither growth, nor health, nor life, is long maintained." The chemical details of a diet just as much as its quantity and energy content make it satisfactory.

Contrary to this view is RUBNER's law of Isodynamic Equivalence: "This involves the principle that any one foodstuff can replace any other so long as the replacement makes no change in the supply of energy."

Professor Hopkins points out that statements like this if not used with great care may become the basis for false doctrine. RUBNER also states that "the duration of growth and the ultimate size of any animal are both functions of the rate of energy exchange in its tissues." Thus it appears that the mouse is small and the elephant large.

The work of VON PIRQUER is next discussed. This worker has applied strict scientific principles to human alimentation. This system, known as the "Nem" system, takes for its unit the energy derived from 1 cc. of milk. ("Nem" is the name given to this unit.) The Nem system is applied to nearly 200,000 school children in Vienna on behalf of the Red Cross Organization. In short, the diet is reckoned in so much energy, 10 per cent. of which is derived from protein. If fat is scarce, sugar is substituted, and so on; so long as the energy content of the food is maintained the ingredients do not matter. This position also is in opposition to Professor Hopkins and his school. The experiments of KROGH and LINHARD of Copenhagen are quoted to show that there is a limit to the interchangeability between fat and carbohydrate.

The rôle of protein in diet receives the consideration it deserves, and certain of the facts regarding the nature and synthesis of protein are discussed. The vitamin question follows logically and the lecturer shows how the "law of the minimum" is more important than the law of Isodynamic Equivalence. It is admitted that when "a diet is harmoniously balanced in a chemical sense, then indeed energy does become the sole limiting factor." In fact, there is a minimum amount of all the factors concerned in dietetics below which the diet fails.

Scurvy, both in its history and modern treatment, is discussed and stress laid upon its production by deficiency. Fat-soluble vitamin, it is stated, will play an important part in the future. Pellagra is

linked up with the food deficiency diseases, and the work of both GOLDBERGER and WILSON is described in this connection.

The concluding remarks concern the visit of Dr. Harriette CHICK and Dr. Elsie DALYELL to Vienna, under the auspices of the Lister Institute. These workers have gone to the home of the Nem system and are applying the newer ideas of dietetics in the wards of VON PIRQUET. "In adjacent wards the Nem system will go on undisturbed. A real comparison will therefore be made."

No prophecy is made concerning the outcome of this experiment, but undoubtedly the results will be of enormous importance to the science of nutrition and therefore to practical medicine.

A. D. Bigland.

HESS (Alfred F.). **Newer Aspects of Some Nutritional Disorders.**—*Jl. Amer. Med. Assoc.* 1921. Mar. 12. Vol. 76. No. 11. pp. 693-700. With 2 charts in text.

This contribution takes the form of a paper read before the Harvey Society on 15th January, 1921. The opening remarks concern the history of the subject, and tell of the remarkable advances during recent years. A warning is given to those who regard vitamins merely as substances without which certain specific diseases, as beriberi and scurvy, occur. The subject is more far-reaching than this, since between perfect health and these well-recognized deficiency diseases there is a wide area where flourish obscure alterations in nutrition and "ill-defined functional disabilities," due to the lacking of certain diet constituents. "It is such incomplete larval forms of the deficiency disorders to which physicians will have to address themselves." Not in man alone but also in the animal kingdom are food deficiency diseases to be found.

Scurvy.—The subacute and latent forms of this disease both in the infant and the adult are discussed, and attention is drawn to the great importance of recognizing types far more prevalent than the textbook variety. The disease shows itself in three particular ways:—(1) A lesion of the lining of the blood vessels, which allows blood to escape and gives rise to all the haemorrhagic conditions associated with the disease. The blood as regards its coagulability is practically normal. A tourniquet applied to the upper arm in these cases will usually cause the appearance of numerous petechiae on the forearm. This condition is not found in any other of the food deficiency diseases, and demonstrates the weakness of the vascular wall. (2) A lesion of the bones. (3) Circulatory disturbances. These furnish a link between scurvy and beriberi. Tachycardia (140-150 in an infant) and marked instability of the pulse-rate are early and characteristic signs. Accompanying these phenomena is a polypnoea (40, 50, or 60 per min.). The complex is known as the "cardio-respiratory phenomena" of scurvy. It yields promptly to antiscorbutic treatment. Enlargement of the heart, especially the right side, and oliguria are also characteristic signs.

As regards the source of antiscorbutic vitamins in temperate zones the potato is all important, and among animal foods milk, of course, is a basal diet for infants. Vegetables must be in good condition or vitamin yield may be lacking, and in the case of milk everything depends upon the fodder of the cow. Many factors causing destruction of the antiscorbutic vitamin are discussed, and stress is laid upon

duration of heating rather than the actual degree of temperature reached, and the great importance of oxidation.

Rickets.—The author thinks that rickets is primarily a dietetic disorder, but that hygienic factors are important contributory influences.

The author concludes his paper with a reference to the inter-relationship of nutrition and infection.

A. D. B.

MCCARRISON (Robert). **The Influence of Deficient and Ill-balanced Diets in Favouring the Development of Gastro-Intestinal Infections.**—*Indian J. Med. Res.* (Special Indian Science Congress Number, 1920.) pp. 38-43.

Two theses are propounded :—(1) "That the freedom of the gastro-intestinal tract from infection depends in the main on the health of the gastro-intestinal mucosa." (2) "Imperfect, ill-balanced and insufficient food is the most ready means of inducing an unhealthy state of the gastro-intestinal tract."

A list of the functions that a good food must subserve is enumerated, and the factors which limit the development of gastro-intestinal infections are discussed. The common factor of all the protective sources is "perfect food." As evidence of the effect of diet upon the intestinal mucosa the author recapitulates his experiments upon monkeys, from which two important facts emerged: (1) "That insufficiency of vitamins is a potent source of bowel complaints"; and (2) "That deficiency or excess of proximate principles in the food greatly favours the onset of gastro-intestinal disorders." The naked eye appearances of the intestines of these monkeys have been already described in this *Bulletin* [Vol. 16, p. 79]. Microscopically, micro-organisms were found to have penetrated even as far as the serous coat of the intestine.

The author does not wish it to be understood that changes of such severity occur often in human subjects, but undoubtedly these results do show what deficient diet carried to its extreme can do. To prove that somewhat similar changes, though less in degree, may occur in human subjects, a case is described of a man who for twenty years had been a confirmed invalid with obstinate constipation, dyspepsia and dilated stomach. An analysis of this man's diet and suitable correction thereof brought about a cure in a short time. One of the factors introduced into the curative diet of this case was a vitamin extract made from the yolk of eggs by alcoholic extraction. Now when this extract was discontinued the patient noticed that his stools which had become dark coloured resumed their white, offensive condition. It is assumed that the vitamin extract promoted the pancreatic and biliary flow. In confirmation of this is cited the work of VOEGTLIN and MEYER, who showed that intravenous injections of extract of brewer's yeast stimulated the biliary and pancreatic secretions, as does secretin.

The paper concludes with an account of BESREDKA's experiments at the Pasteur Institute of Paris. Ox-bile is given to healthy rabbits; a few hours later an emulsion of typhoid or paratyphoid bacilli is administered orally. Typhoid or paratyphoid supervene. Healthy rabbits to which typhoid emulsion is administered without a previous dose of ox-bile do not develop the disease. BESREDKA stated that the

action of ox-bile was to cause intestinal erosions, and thus allow the bacilli to gain a footing. The author repeated these experiments with a single rabbit and its control, and obtained the same results.

A. D. B.

FABRONI (Bruno). **Sindromi fruste od associate nelle distrofia alimentare per avitaminosi.**—*Riv. Pellagrol. Ital.* 1920. Sept.-Dec. Vol. 20. No. 5-6. pp. 35-41.

The writer has observed in 42 patients, treated in one of the war-stricken districts of Italy between the end of 1918 and the summer of 1920, what he describes as abortive syndromes of avitaminosis (*sindromi fruste d'avitaminosi*). After a longer or shorter period of general debility with anorexia and transitory headaches, the patient experiences an afebrile disorder of the gastro-enteric apparatus. A diarrhoea appears, which is rebellious to every astringent treatment, and is accompanied by nausea and distaste for the habitual food. At the same time there is oliguria and slight oedema, which comes and goes without apparent cause. The patient is easily fatigued, and complains of dyspnoea and tachycardia. Sometimes there is a sensation of dryness in the fauces and throat, followed, after some days, by gingivitis. In other cases there may be slight ecchymoses or definite petechiae. Myalgia, disorders of the sense of touch and increased reflexes are also observed.

In addition to the cases grouped under this syndrome, the writer discusses three "mixed" groups. In the first, comprising eight cases, the symptoms included some of the typical symptoms of scurvy. In the second group, of five cases, the marked development of dropsy was the most notable of some symptoms suggesting "hunger oedema." In the third group (10 cases) the symptoms of pellagra were the most prevalent.

J. Rosslyn Earp.

CRAMER (W.), DREW (A. H.) & MOTTRAM (J. C.). **Similarity of Effects Produced by Absence of Vitamins and by Exposure to X-rays and Radium.**—*Lancet.* 1921. May 7. pp. 963-964.

The authors state that "vitamins are necessary for the maintenance of life of a highly differentiated animal as a whole, but not necessarily or probably of its individual cells." Lymphoid tissue, however, is one tissue which is probably affected in avitaminosis. In mice and rats fed upon a diet containing no vitamins the spleen is found to be much wasted, the thymus (a large organ in these animals) is hardly visible, and the Peyer's patches are difficult to recognize with the naked eye. Microscopically, the spleen and lymph glands are found to be almost bare of lymphocytes, while blood-counts show a reduction in the number of lymphocytes and an increase in the number of polymorphs. "This condition of the lymphoid tissue is practically identical with that produced by exposure to X-rays and radium." Not only is the lymphoid tissue affected, but the animals die in a state of emaciation. The authors suggest that these observations show that lymphoid tissue plays a more important rôle in nutrition than is usually recognized. Further investigations are proposed.

A. D. B.

PERROT (E.) & LECOQ (R.). **Sur la valeur alimentaire de quelques farines composées du commerce au point de vue leur constitution chimique et de leur teneur en vitamines.**—*C. R. Soc. Biol.* 1921. Mar. 19. Vol. 84. No. 11. pp. 529–530.

The authors recount their experiments on more than 60 animals with regard to the dietetic value of certain commercial flours. Twenty-three flours were thus examined. The white rat was the animal chosen for the work. With “diète hydrique” loss of weight is rapid and death occurs in less than fifteen days. Fed upon “pain actuel” the animals show at the beginning a certain increase in weight, followed by a long “plateau”; death is delayed, and in one case the rat lived for more than six months. Of the 23 commercial products, 17 showed a value lying between the figures derived from these two type diets. Some of these flours gave results very little different from those obtained with the “diète hydrique,” and were followed by death almost as rapidly. Three flours were comparable to the bread regime, and three only were proved superior to this.

The authors draw attention to the gravity of the position thus revealed, especially as these commercial flours are intended for children and convalescents. They claim that we have the right to insist that the manufacturers reconstruct their manifestly insufficient formulae.

A. D. B.

SHORTEN (J. A.). **The Vitamin Content of Certain Sun-dried Vegetables.**—*Proc. Roy. Soc. Med.* (Sect. of Therap. & Pharm.). 1921. June. Vol. 14. No. 8. pp. 20–21.

A new and important industry has sprung up in Quetta concerned with the drying of vegetables in the air. The climate is such that “most vegetables can be completely desiccated in less than a day.” The preliminary preparation includes cleaning, slicing, and scalding or steaming for a short time. The vegetables are then cut into slices and dried in the sun. They are finally compressed and placed in air-tight tins. The product apparently retains its original colour and taste even when cooked after a preliminary soaking in water.

It was decided to test these dried products with regard to their antiscorbutic and antineuritic vitamin content. For the former purpose guinea-pigs were used, while for the latter fowls were chosen. The animals were fed upon the usual basal diets, with the addition of a certain amount of the dried vegetable in question. Controls were used. It was found that as regards antiscorbutic properties, tomatoes, cabbages and potatoes, in this order, functioned well. Dried carrots, brinjal, spinach, turnip tops and turnips, together with a mixed dry vegetable product from Australia, showed little or no antiscorbutic properties. None of the sun-dried vegetables showed loss of antineuritic substance.

Animals fed upon the sun-dried products soaked in water, but uncooked, lived longer than those fed upon soaked and cooked samples. It is recommended that the products should be eaten in salad form.

Further experiments are in progress concerning the influence of the initial scalding and steaming process on the vitamin content.

A. D. B.

- i. HOPKINS (Frederick Gowland). **Notes on the Vitamine Content of Milk.**—*Biochemical Jl.* 1920. Dec. Vol. 14. No. 6. pp. 721-724. With 4 charts.
- ii. HAWK (Philip B.), SMITH (Clarence A.) & BERGEIM (Olaf). **The Addition of Yeast to a Milk Diet.**—*Proc. Soc. Experim. Biol. & Med.* 1921. Mar. 16. Vol. 18. No. 6. p. 168.
- iii. ROSENAU (M. J.). **Vitamins in Milk.**—*Boston Med. & Surg. Jl.* 1921. May 5. Vol. 184. No. 18. pp. 455-458.
- iv. LE NOIR (P.) & RICHEL (C.). **Deficiency Disease.**—*Paris Méd.* 1921. May 7. Vol. 11. No. 19. p. 376.

i. In 1912 Hopkins first showed the startlingly favourable results following the addition of minute amounts of milk to synthetic diets incapable themselves of maintaining the growth and health of rats. OSBORNE and MENDEL in 1920 reported that they were unable to confirm these results. Hopkins, in trying to repeat his earlier experiments, was successful with "summer" milk but failed with "winter" milk. OSBORNE and MENDEL were unable to confirm this. A possible explanation of these disagreements is that there is a seasonal factor in the growth energy of rats.

ii. Hawk and his colleagues fed rats upon pasteurized milk and found that the addition of yeast to the milk increased the rate of growth. From this result, coupled with the fact that milk is poor in water-soluble B vitamin, the authors draw the conclusion that yeast may be found to be an important adjunct in baby feeding.

iii. Discussing canned and dried milks, Rosenau states that anti-scorbutic vitamin is the only one which may be affected in these preparations. The amount of this vitamin depends upon the content of the original milk and also upon the processes of heating and evaporation with special reference to oxidation.

iv. Le Noir and Richet are in complete agreement with the above statements.

A. D. B.

- i. BLOCH (C. E.). **Clinical Investigations of Xerophthalmia and Dystrophy in Infants and Young Children. (Xerophthalmia et Dystrophia Alipogenetica.)**—*Jl. of Hyg.* 1921. Jan. Vol. 19. No. 3. pp. 283-304. With 3 plates and 5 charts.
- ii. GUERRERO (L. E.) & CONCEPCION (I.). **Xerophthalmia in Fowls fed on Polished Rice and its Clinical Importance.**—*Philippine Jl. Sci.* 1920. July. Vol. 17. No. 1. pp. 99-103.

i. Children fed upon a diet deficient in "fat-soluble A bodies" develop dystrophia alipogenetica. This condition involves a lowered resistance to infection, and often leads to xerosis of the conjunctivae and cornea, with night blindness. Keratomalacia may result from this. In the first stages of the disease slight conjunctivitis with photophobia will be noticed. The disease generally occurs in the spring and amongst the children of the poorest country folk. The best treatment is cod-liver oil, or other substances containing fat-soluble bodies.

ii. The second paper shows that pigeons fed upon polished rice and "Tikitiki extract" may develop not only polyneuritis, but also xerophthalmia. The authors conclude that polished rice is therefore lacking in both vitamins A and B.

A. D. B.

KELLAWAY (C. H.). **The Effect of Certain Dietary Deficiencies on the Suprarenal Glands.**—*Proc. Roy. Soc. Ser. B.* Vol. 92. No. B 642. pp. 6-27. With 1 text fig. and 1 plate.

The author confirms the experiments of McCARRISON with regard to suprarenal enlargement and increased store of adrenalin in pigeons fed upon polished rice. These changes are prevented by the addition of yeast extract. The increased adrenalin content is attributed to the diminished output of this substance as a result of lowered body metabolism. The oedema occurring in some cases of experimental neuritis is not due to increased output of adrenalin. The enlargement of the suprarenals is due partly to congestion and oedema of the glands, and partly to the storage of lipoid substances resulting from the breaking down of body tissues. In these pigeons the cholesterol content of the suprarenals is normal, though there is a well-marked hypercholesteræmia.

A. D. B.

TUBERCULOSIS IN THE TROPICS.

SCOTT (Henry Harold). **Report on Tuberculosis in the Far East: An Analysis of the Post Mortem Findings in 300 Consecutive Cases of Death from Tuberculosis, with Special Reference to the Disease as met with in Children in Hongkong.** [MS. Report dated 8th June, 1921, received from the Colonial Office.]

This Report deals with a long series of careful post-mortem examinations on patients, mostly children, dying from tuberculosis in Hong Kong. It is obvious that the investigation has been carried out on systematic lines by one well qualified for the work. The material at the author's disposal was large in amount and the results have been carefully analysed. The result is a report which is of a very high order of merit and calculated to add considerably to the existing knowledge as to the portals of entry of the tubercle bacillus.

The work is divided into four portions. In the first, the author discusses the epidemiology of the disease in general, the conclusions being drawn "firstly, that hereditary transmission of the bacillus is so rare that for practical purposes it may be declared negligible; secondly, that the incidence of tuberculosis depends on two main factors, namely, the dose received and the virulence of the strain inoculated, in other words, the degree of exposure to infection and the resistance which the inoculated subject is able to put forward, this, in turn, being dependent largely on his environment; thirdly, that there is not sufficient evidence, at present at all events, to afford support to the theory that there is such a thing as inherited predisposition to tuberculosis." The author is alive to the fact of acquired resistance as he mentions it specifically later on, quoting the experiments of BRYANT in the immunization of guinea-pigs with small doses, but he does not seem to think it plays much part in Hong Kong. On the other hand, he sees "no reason for regarding the Chinese as exhibiting any special susceptibility to the bacillus of tuberculosis, in spite of the frequency with which cases are met with in the mortuary. The prevalence is in part due to the exclusion of light and air from their dwellings, but in large measure to the pernicious habit of spitting." He gives a very interesting picture of the housing conditions in Hong Kong, and these are undoubtedly such as greatly to facilitate the transmission of the bacillus from man to man. Without in the least desiring to minimize the importance of this bad environment, we would point out that the men of the Chinese Labour Corps in France, placed under relatively excellent conditions of housing and food, showed a very high incidence and mortality from tuberculosis in comparison to the British and French troops engaged in the same areas. From observations made during the war, we are inclined to impute to the adult Chinese a very definite degree of susceptibility or rather, as we prefer to put it, a very low degree of acquired resistance. In this connexion it is of great interest to note in the Report under review that "the ingestion of tuberculous milk, which is supposed to play a large part in the production of tuberculosis, especially intestinal tuberculosis, in children in England, has no influence here, for the Chinese children do not drink milk, nor does it arise here from the use of tuberculous meat."

Seeing in faulty environmental conditions and in the spitting habit the principal factors in the spread of tuberculosis in Hong Kong, the author recommends, as the first and greatest need in prevention,

a campaign of education as to hygiene, through the Chinese doctors who come into close touch with the people on the one hand, and by means, perhaps, of the Y.M.C.A. and Y.W.C.A. on the other. Finally, he advocates the initiation of a "Tuberculosis Dispensary." As he wisely expresses it, "Enlightenment is not only better than repression, but is really the only method likely to be crowned with any success."

In the second portion of the Report are considered the portals of entry and mode of spread of tuberculosis in the light of the work carried out by the author, and, in the third portion, he discusses the morbid anatomy as met with in cases among children. As these two portions of the Report are complementary to each other, they will be discussed together.

"Of the whole 300 cases, there were 209 in which the primary portal of entry appeared to be the respiratory tract, *i.e.*, 69.66 per cent., and in 7 others . . . there was considerable evidence in support of the same portal, bringing the total to 216, or 72 per cent.

"Only 32 have been definitely determined as being of alimentary origin, *i.e.*, 10.66 per cent.; five more, discussed under 'Uncertain primary portal' were very likely alimentary; this would bring the total to 37 or 12.33 per cent.

"In four other cases there was a possibility of almost simultaneous entrance by way of the respiratory and alimentary tracts."

In the 43 remaining cases the primary portal of entry is regarded by the author as uncertain. These uncertain cases are discussed in individual detail and the reader is thus enabled to form his own opinion as to the probable mode of entry of the bacillus in each patient. So far as we could judge from a careful perusal of these excellent and careful records, the majority were, in all probability, cases of invasion by the respiratory route, but we concur with the author in his decision to base his conclusions, as far as possible, only on undoubted cases, and we agree as to the wisdom of keeping these less definite cases apart.

Part III really consists in a comparison of the findings of the author with those of CANTI. On the whole the agreement is close, but there are certain points in which differences arise. So important is this portion of the work that it requires notice in some detail. Following the method of the author of taking CANTI'S conclusions in order and comparing his own findings in each case, we will attempt to summarize his work on the same lines.

1. "The almost constant finding of a lung focus when tuberculous mediastinal glands are present and the close relation of these glands to the lung focus" (CANTI).

Dr. Scott finds this statement to be true of the majority of the cases examined by him, but he notes 29 exceptions. Of these, 12 are excluded, 11 having strong evidence of primary alimentary infection, and one "having a tuberculous abscess of the sixth cervical vertebra discharging into the right pleural cavity which might explain the involvement of the mediastinal glands." There remain 17 cases in which the mediastinal glands showed definite tuberculous lesions without any discoverable lung focus to explain the adenitis. Particulars of all these cases are given in detail and they are worthy of careful perusal and close consideration. As to the "close relationship of these glands to the lung focus," the author found this to apply in most cases, but there were four in which the glands involved did not correspond with the focus in the lung.

2. "The frequent singleness of the lung focus" (CANTI).

In 16 cases described by CANTI eight, or 50 per cent., had a single focus. GHON recorded 72·35 per cent. Dr. Scott found, in 225 children under 10 years of age, 137 with lung foci. Of these 95, or 69·34 per cent., had a single focus. There were 42 cases, or 30·66 per cent., with more than one focus. Of the latter, 32 had two, 5 had three, and 5 had several foci in the lungs. The distribution as to lobes in these 137 cases was as follows :—

Right upper lobe	42
Right lower lobe	41
Left upper lobe	32
Left lower lobe	26
Right middle lobe.. ..	22

3. " The constant finding of tuberculous mediastinal glands where a lung focus was present " (CANTI).

The author remarks : " In adult cases, this has certainly not been my experience here, but it appears to hold good with nearly all cases in children." He quotes nine cases, however, of children in which lung lesions were present without coexistent disease of the mediastinal glands.

4. " The almost constant absence of a lung focus when the portal of entry appeared to be elsewhere " (CANTI).

Excluding cases in which a dual route of infection appeared probable, Dr. Scott says " There still remain a few in which a lung focus was found although the primary portal of entry was probably not *via* the respiratory tract." He quotes these four cases in detail, but we are obliged to admit that, so far as the notes go, they appear to us to point to infection through the respiratory rather than through the alimentary tract. This must, however, remain a question of opinion until fuller knowledge of the responses of the body to infection is available.

5. " The almost constant absence of evidence that the portal of entry might be elsewhere when a lung focus was present " (CANTI).

On this point the experience of Dr. Scott is distinctly at variance with that of Dr. CANTI. As he expresses it :

" Such a proposition would seem to put forward the claim that, given a primary lung focus due to respiratory route infection, there is little, if any, likelihood of the intestine becoming affected unless secondarily to the pulmonary focus. This cannot be ascribed to an increased resistance or immunity, owing to the presence of the lung tuberculosis, because it is a well-established fact that intestinal tuberculosis can arise from the swallowing of infected sputum."

He gives several instances which he thinks do not fit in with CANTI's proposition.

For our own part we hold that sensitization of the organism by initial entry of the tubercle bacillus is essential before local reaction can follow fresh contact with the germ. The experiments of CALMETTE, GUERIN, and BRETON, quoted by the author, prove that the tubercle bacillus can penetrate the membranes of non-resistant animals (guinea-pigs) without setting up lesions, coming to arrest in the lymphatic glands beyond. It is *after* such preliminary penetration that inflammatory reaction to the advent of further bacterial invasions leads to focal changes in the lung or ulcerative changes in the intestine. It is thus that we should explain the instances cited by the author of involvement of mediastinal glands without lung lesions in occasional cases of massive infection ; and it is for the same reason that we regard

ulcerative lesions of the bowel in tuberculosis as a sign of *previous* infection, not as a sign of *primary* infection of the alimentary tract.

It is not, however, our desire to attempt to criticize the conclusions of the author but rather to pay a high tribute of praise to one of the most thorough and comprehensive investigations that we have yet met with on a very important sphere of research in tuberculosis.

The fourth portion of his paper consists of careful details of each case examined and is a model of what such records should be. His comparison of post-mortem findings in Chinese children with the findings of Dr. CANTI, in London, and those of ALBRECHT and GHON, in Germany, is particularly useful and points to a line of research that might be profitably followed in other colonies and protectorates of the British Empire.

S. Lyle Cummins.

SCOTT (Henry Harold). **The Prevalence and Character of Tuberculosis in Hongkong. Parts 1 & 2.**—*Ann. Trop. Med. & Parasit.* 1921. Sep. 30. Vol. 15. No. 3. pp. 213-243. With 1 text fig.

Since the receipt of this Report in manuscript from the Colonial Office, the greater part of the work has appeared in the *Annals of Tropical Medicine and Parasitology*. As the summary given above covers the published articles, no further review is necessary, but those interested in tropical tuberculosis are strongly recommended to peruse the papers now available for study; they constitute an important contribution to this subject, as well as to our knowledge of tuberculosis in general.

S. L. C.

MITCHELL (J. Alexander). **The Problem of Tuberculosis in South Africa.** (Address given at the Congress of the Municipal Association of the Cape Province, Cape Town, March 8, 1921.)—*S. African Med. Rec.* 1921. June 25. Vol. 19. No. 12. pp. 226-230.

Dr. Mitchell shows how tuberculosis, rare or unknown in the early days of the Colony, has become more and more frequent as communications have improved, towns developed, industries become established, and native populations, formerly isolated, been recruited for the mines and for other work involving adaptation to a new mode of life. Tuberculosis has been notifiable in the Cape Province since 1907, and throughout the Union since the passing of the Public Health Act in 1920. The statistics, however, are far from reliable, the percentage of unnotified cases being very high. "The great majority of the sufferers are young adults, who are thus disabled, and in many cases killed, at the age when they are of the greatest economic value to the State." The author has great hopes for the future of anti-tuberculosis measures so far as the protection of Europeans is concerned, but "as regards the Coloured and Native, the outlook is much less hopeful, mainly owing to their susceptibility to the disease and the difficulties of enforcing precautions against its spread." The author lays much stress on alcohol as a potent factor in the prevalence and spread of tuberculosis amongst the coloured folk. He is not alone in this opinion. It is held by nearly all writers on the tuberculosis of primitive peoples. And yet we are unaware of any really critical investigation that gives the theory support. The susceptibility of these African tribes is paralleled by the susceptibility of cattle from tubercle-free localities when brought into contact with infected herds ;

and yet, as CALMETTE so wittily pointed out at the recent International Conference, "It is difficult to believe that the prevalence is due to alcohol amongst these poor beasts."

S. L. C.

YOUNG (J. F.); GIRDWOOD (A. I.); & others. **Tuberculosis: Discussion on Tuberculosis as found on Examination of British South African Natives and of East Coast Recruits.**—*Proc. Transvaal Mine Med. Officers' Assoc.* 1921. Aug. Vol. 1. No. 5. pp. 2-11.

The discussion here summarized was opened by Dr. J. F. Young, Medical Officer, Native Recruiting Corporation, Driehoek, who spoke on the examination of B.S.A. natives. He began by describing the methods of medical examination in force at the branch offices of the Native Recruiting Corporation in Cape Colony and Pondoland. A doctor is attached to these offices to examine the mine recruits. At the smaller branch offices the natives are merely inspected, but at the larger ones "they are usually auscultated." For the year ended on 31st December, 1920, 30,554 natives were examined, and 807, or 2.64 per cent., were rejected for "defective lungs," and, in addition, 56 for tubercular glands. Dr. Young estimates that 75 per cent. of the "defective lungs" were tuberculous cases. In another group of 36,243 natives examined, 738, or 2 per cent., had tuberculosis. "During 1919 at Sterkstroom all natives rejected for defective lungs were sent back home." For the year ended May, 1921, at Germiston, 62,942 natives were examined. Of these, 1,075, or 1.7 per cent., were rejected for "defective lungs," but the number of these suffering from tuberculosis was not differentiated. In the course of the paper the remark is made that British Basutos are far less afflicted with "defective lungs" than the Colony natives.

Dr. Girdwood, Chief Medical Officer, Witwatersrand Native Labour Association, now contributed a paper on the examination of East Coast Recruits, and explained that the system of examination of these recruits was somewhat superficial as compared with that of the British South Africans. His paper, however, constitutes a very valuable contribution and shows a real familiarity with his subject. The East Coast natives are recruited from the Province of Mozambique, south of lat. 22°. Throughout the year 1920 a total of 60,164 East Coast natives were examined. Of these, a total of 1.86 per cent. were rejected for all causes. Of 462 rejected by Dr. Girdwood, only 83 were suffering from tuberculosis. Post-mortems on 39 new recruits who died before working only brought to light two cases of tuberculosis. "Out of the 174,402 natives employed on the gold mines during 1920, 28 were compensated for tuberculosis or silicosis during the first two months of their contract. The number compensated steadily increases, to reach a maximum during the fifth and sixth month of their service." Dr. Girdwood is of opinion that pulmonary tuberculosis is not common amongst East Coast natives, and he cites Dr. TURNER, who found, in 1905, that only 14 cases could be detected after an extensive tour of the district, 10 of which proved to be natives who had returned from the mines. These East Coast men are much more susceptible than the British South Africans, and, once at the mines, evince a terrible liability to the disease, explicable, according to Dr. Girdwood, on one of the following hypotheses: (1) that the disease may be a new one to them so that they have not yet acquired an hereditary immunity to it; or (2) that they have enlarged spleens and malaria, and thus a lowered

resistance ; or, again (3) that the length of contract, one year, may have something to do with it.

Dr. ALLEN now spoke, and agreed with Dr. Girdwood that tuberculosis is extremely rare among new recruits coming up for the first time. He was of opinion that the infection among the natives is acquired on the mines. "The compound, congregated as the boys are in it, is the focus of infection." Dr. BOIGELOT, Medical Inspector of Native Labour for the Congo, now spoke, and made an interesting communication as to the great rarity of tuberculosis amongst the natives in his area, except in the immediate vicinity of infected persons from outside. He laid stress on the value, as an index of good health in natives, of the shine and brilliancy of the hair, the colour and glow of the skin and its elasticity when pinched up. Dr. BROOKE now spoke, and explained that, in the native territories with which he was acquainted, tuberculosis was on the increase, largely due to the taste for education developed by the natives and the crowded conditions in their schools and association with infected school teachers. He raised the question of the difficulty of examining more than 40 or 50 chest cases in a morning. He also spoke on the difficulty of early diagnosis, and mentioned the frequency with which indefinite crepitations are found along the margins of the lung in the native.

Several other interesting contributions were made to the discussion, notably by Dr. ORENSTEIN and Dr. FREW. Referring to Dr. Brooke's remark, Dr. Young said that he had often to examine as many as 560 or more natives in the morning.

The impression gained on reading this discussion is that the examinations of these recruits are of a perfunctory nature and that the work is far in excess of what can be properly carried out by the staff available. It is clear that the whole system by which native labour is recruited, exploited and returned, often infected, to its original surroundings when no longer fit for work is eminently calculated to spread the disease far and wide in the crowded huts of insanitary native villages, where the disease was, until recent times, unknown. That this is actually happening may be gathered from the remarks of Dr. Brooke, and the conditions that assure a rapid spread are shown, by Dr. Girdwood, to exist in a typical form in the districts where the East Coast recruits are obtained. These conditions are an absence of any considerable prevalence of tuberculosis in a given area, a race with a high susceptibility to the disease, and the return of infected cases from the mines. One would imagine that the mining companies themselves ought to be alive to the unscientific nature of such methods, which can only end in destroying the quality and diminishing the quantity of available labour.

S. L. C.

ROBERTSON (D. G.). **Inquiry into the Prevalence of Tuberculosis at Bendigo.**—*Commonwealth of Australia Quarantine Service Publications.* 1920. Mar.-Aug. No. 19. 70 pp. With 12 text figs.

Owing to the loss of life during the war, the Commonwealth Government, in 1916, appointed a Committee to enquire into, and advise as to the best means of preventing, death and invalidity in the Commonwealth itself. This Committee, in regard to tuberculosis, made the following suggestion :—"That the Commonwealth Government co-operate with the State Government concerned in a vigorous campaign against tuberculosis in a selected locality in which it is more than

ordinarily prevalent." The mining centre of Bendigo was selected for this experiment because it offers the chance of attacking not only the general problem of tuberculosis but also the special problem of tuberculosis in mines.

The article under review deals with the preliminary enquiry as to tuberculosis in Bendigo district and includes recommendations as to how the problem should be dealt with. The Report is of the highest interest and value, not specially as a contribution to "tropical tuberculosis," as the population concerned is of European extraction and lives under the conditions of industrial life common to workers elsewhere, except for the fact that there is a terribly high incidence of silicosis due to mining in quartz, but as a contribution to the general problem of industrial hygiene. The paper is so interesting that it merits a very complete notice, but, in view of its slight bearing upon tropical medicine, its main points only will be summarized at the present time. Under the heading of "Statistical Data" an interesting account is given of tuberculosis in Bendigo from 1905 onwards. Charts A, B, and C illustrate graphically the annual notifications of pulmonary tuberculosis in the area from 1905 to 1919, the two latter comparing the notifications of males with those of females. These charts bring out the interesting fact that, while up to the age of 25 to 30 the incidence amongst females slightly exceeds that of males of the same ages, the male curve continues to rise to an apex between 40 and 44, after which it falls rapidly, the female curve dropping steeply after 30. It would seem that very few females are affected late in life, while some factor operative in males leads to a preponderating incidence in middle age. This factor is silicosis, which tends in Bendigo, as elsewhere, to greatly increase the phthisis death-rate. The paper contains one of the best clinical accounts of silicosis that we have seen and the further note on "tuberculosis complicating silicosis" is likewise very good. The author takes the generally accepted view that the tuberculous condition is a super-infection of the lung already injured by silicosis. There must be ample opportunity for infection in the Bendigo mines as no less than 18 or 3·15 per cent. of 570 working miners were found, on examination, to be suffering from tuberculosis, while 41·25 per cent. of 160 ex-miners had the disease. The close association between the degree of silicosis and the incidence of tuberculosis is well brought out by the records in groups with and without machine drill work. Those who work with the drill are exposed to more concentrated dust, get more silicosis, and have a higher incidence of tuberculosis than the others.

There is an interesting note on chest expansion which gives results as follows:—In 345 healthy men, average expansion, 3·2 in.; in 150 "early silicosis" cases, 2·4 in.; in 54 "intermediate silicosis cases," 1·9 in.; in 3 "advanced" silicosis cases, 1·1 in., and in 18 tuberculosis cases, 2·2 in.

A valuable record of Von Pirquet tests in miners and non-miners is also given, of which the main results are as follows:—

	Total.	Von Pirquet
		+
1. Persons classified as tuberculous	60	.. 55 or 91·7%
2. Miners and ex-miners (Group 1 excluded)	37	.. 21 or 56·7%
3. Contacts with tuberculous persons	226	.. 135 or 60·0%
4. No history of exposure to TB	69	.. 16 or 23·2%

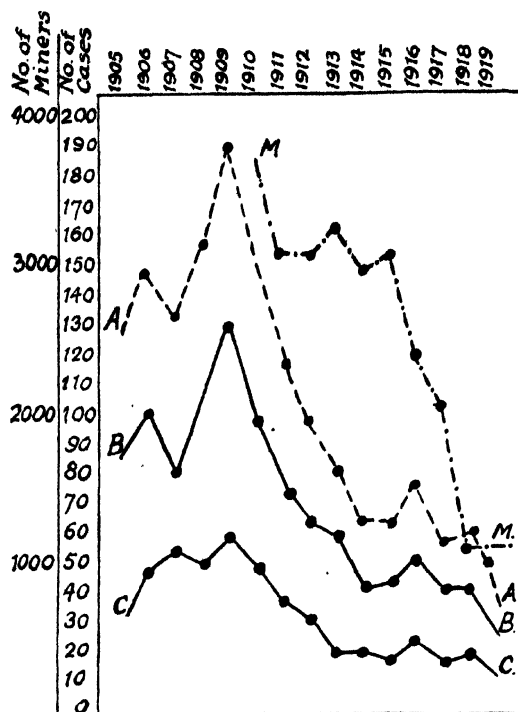


Chart A.—Annual Notification of Pulmonary Tuberculosis.
Bendigo District, 1905-1919.

AA. Total Notifications. CC. Female Notifications.
BB. Male MM. Number of Miners employed.

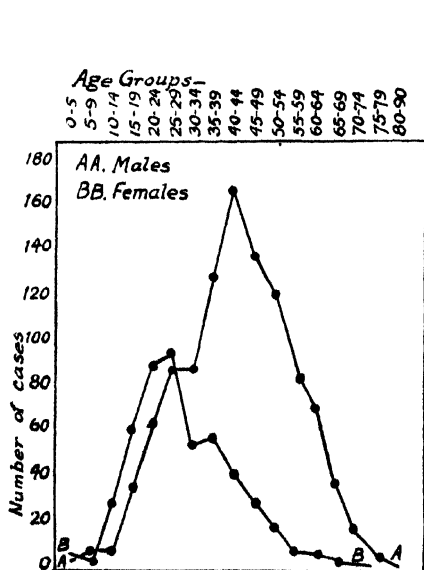


Chart B.—Notification of Pulmonary Tuberculosis, Bendigo District, at Various Ages.

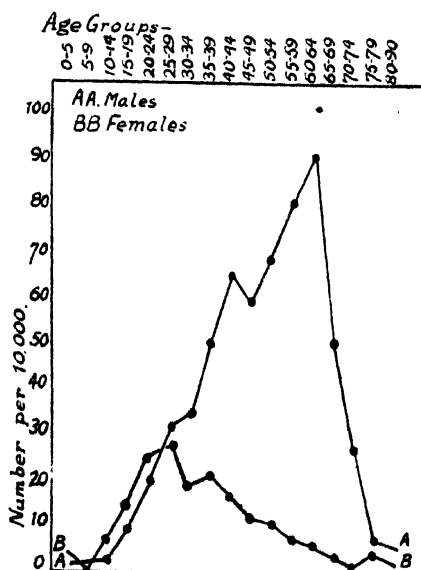


Chart C.—Average Notification Rates, 1905-1919, of Pulmonary Tuberculosis per 10,000 living at each Age Period in the Bendigo District in 1911.

The recommendations include the provision of a Sanatorium and a Clinic, a Medical Officer and a Nurse, the services of a half-time Radiographer from Bendigo Hospital, better financial help to families where the breadwinner is incapacitated by tuberculosis and the immediate introduction of a Miner's Compensation Act to meet the incapacity caused by silicosis, a purely occupational disease.

S. L. C.

COLOMBANI with VUILLET. **Le problème de la tuberculose au Maroc.**
—*Bull. Office Internat. d'Hyg. Publique.* 1921. Apr. Vol. 13.
No. 4. pp. 360-366.

"Il y a peu d'années encore, la population marocaine semblait particulièrement favorisée quant à la fréquence de la tuberculose pulmonaire." It is the old story: a country free or almost so from this disease until the arrival of the European civilization that brings with it the healthy carriers of infection, the advanced cases in search of a climatic cure, the industrial developments that require native labour to exploit them, and the invitation to participate in a Western mode of life that seems so attractive to the African. And the disease soon gains a footing and is not slow to exploit the virgin soil of these tribesmen who fall an easy prey to its ravages. The rapidity of its spread in Morocco may be gathered from Table I, which is here reproduced.

Pulmonary Phthisis at the Tangier Hospital. 1900-1919.

<i>Year.</i>	<i>Number of Admissions for Pulmonary Phthisis.</i>			<i>Number of Deaths from Pulmonary Phthisis.</i>		
1900-1903	15	..	..	2
1904-1907	28	..	..	4
1908-1911	88	..	..	22
1912-1915	96	..	..	22
1916-1919	121	..	..	33

The authors find an explanation of this rapid spread in the profound changes that have taken place in the economic and social life of a population until recently outside the movements of our modern civilization. They quote the immense strides made by sanitary science in Morocco. "So far as concerns malaria, syphilis, dysentery, enteric fever, plague or typhus, to quote only a few examples, the results obtained have been as satisfactory as possible." "Pourquoi la tuberculose fait-elle exception dans cette amélioration générale?" The authors answer their own question by quoting the words of LANDOUZY: "Social evolution goes ahead so fast that hygiene, soon outdistanced, gets left behind." Yes, this is all very well and the quotation is attractive; but why is it only that the hygiene that might deliver man from tuberculosis gets left in the lurch while the hygiene appropriate to prevent typhoid, typhus, plague, malaria, etc., keeps pace with other forms of human progress? The truth is that, in all these diseases, the hygienist has been taught by the laboratory worker some special method of prevention that is efficacious while, in the case of tuberculosis, the special method has not yet been found and we flounder in the morass of general hygiene which is unequal to the stamping out of this difficult foe.

The spread of this disease is very little affected by our preventive methods either in Africa or in Europe. The mortality from the

chronic form of phthisis common in our cities does vary with the general death-rate and falls where the general standard of hygiene is high, but this is because *infected persons* die if exposed to a bad environment. The "young adult" type of mortality, common in Ireland, Wales, the Shetlands, and other relatively isolated places in the West, and comparable to the type of death-rate in Morocco, is not found to vary with the general death-rate or with the state of efficiency or otherwise of the sanitary organization of the community, but requires to be explained in terms of liability to infection, not liability to relapse. We fear, too, that the inevitable appeal to alcohol as a valid explanation will hardly serve to account for all the facts. Rather do we turn to such investigators as CALMETTE, BUSHNELL and ZIEMANN for the work that they have done on the influence of acquired immunity as the fundamental factor behind these phenomena. The authors have written a valuable and interesting paper and we heartily endorse their recommendation for an energetic campaign against tuberculosis in Morocco.

S. L. C.

TRABAUD. *Mémoires sur la tuberculose dans l'armée et dans les troupes indigènes et sur la prophylaxie de cette affection.*—*Arch. Méd. et Pharm. Milit.* 1921. Vol. 74. No. 4. pp. 432-436.

This paper is an analysis, by PERDRIZET, of an original report by Trabaud, submitted to the Technical Section of the Army Medical Service. It is to be hoped that the original Report may, in the future, be published in full, as the summary gives promise of a highly interesting and valuable paper. Trabaud deals with what is evidently a rich collection of clinical and post-mortem records under three heads: tuberculosis in the Senegalese, tuberculosis in Arabs, and, finally, a comparison of tuberculosis of the white races with that of Primitive races. In his description of the disease, as it affects the natives of Senegal, his findings correspond closely to those of BORREL [*this Bulletin*, Vol. 16, p. 190], but he considers that the statement of the latter that the presence of a palpable enlargement of a subclavicular gland is a sure sign of pulmonary tuberculosis is too exclusive, since this sign often indicates abdominal tuberculosis, while, on the other hand, axillary adenitis is often a sign of pulmonary or pleural infection. Where a subclavicular gland is found enlarged as a result of abdominal tuberculosis, Trabaud takes the view, with KUTTNER, that the tuberculous embolus has followed the collateral path indicated by the latter observer, passing by an efferent branch of the internal mammary chain of lymphatics that leads into the subclavicular glands of the infero-internal group; and he records two cases in support of this opinion. These observations lead to the conclusion that tuberculous infection in the Negro is not confined to the pulmonary route, but often starts by ingestion of the bacilli and invasion through the alimentary tract. The outstanding feature of tuberculous infection in the Negro is its predilection for the lymphatic system, the glands tending to react by a rapid and voluminous caseation, as in the younger age groups in Europeans. With this goes a tendency to extensive caseous pneumonia, with the final formation of ragged soft-walled diffuent cavities, contrasting sharply with the indurated and regular walls of the cavities commonly found in European adults. A clinical finding noted by the author, and not quite in line with the usual post-mortem findings in blacks, is that definite signs of disease can be made out at the apices in 85 per cent. of cases. He lays stress on the loss of satiny lustre in the black skin and a general flabbiness

of the muscles, which are valuable and early indications that the patient has contracted tuberculous disease.

In contrast with the natives of Senegal, the Arabs show a higher resistance to the tubercle bacillus, but are less protected than Europeans, the usual type of lung lesion seen at post-mortem being scattered foci of caseation corresponding to broncho-pneumonic patches of different sizes, but not, as a rule, larger than an orange. The glands of the hilus, too, are often enlarged and caseous, but less so than in the Negro. The Arab, then, occupies a place between the Negro and the European, and probably owes what extra resistance he possesses to contact with the latter. In comparing the manifestations of the disease in primitive races with its course in Europeans, Trabaud finds that the picture presented by the disease in these peoples bears a close similarity to that noted in European infants, and in this view he voices an opinion already expressed by BORREL. The paper closes with an excellent scheme for prevention of spread of infection in "Native" military formations, which deserves attention by those serving with troops drawn from isolated communities in the tropics or elsewhere.

S. L. C.

BRITISH GUIANA. **Fourteenth Annual Report of the British Guiana Society for the Prevention and Treatment of Tuberculosis.**
[MINETT (E. P.), Hon. Secretary.] 1920.—18 pp.

This report, the fourteenth published by the Society, is chiefly concerned with the administrative measures and the arrangements for finance and staff, which are always an important feature in such organizations. There must, however, be a great deal of interesting information to be had in a community where the population includes several racial strains, and it is to be hoped that questions relating to the incidence and mortality in Africans, East Indians, Portuguese, British, etc., may receive attention in future reports. The patients seen at the dispensaries at Georgetown, New Amsterdam and Schoonord are dealt with under age groups, races, occupations, etc., but these figures give no light on the relative severity of the disease in these groups, as only the people attending the dispensaries are dealt with, and the population from which these patients are drawn may be large or small, rich or poor, susceptible or resistant, for all the statistics tell us. The retrospect of the tuberculosis death-rate per 1,000 persons living from 1876 to 1920 is of decided interest, and is encouraging also, as the mortality for British Guiana has fallen from 2.36 from 1876-1881 to 1.34 in 1920. The death-rate in the towns—Georgetown and Port of Spain—has always been higher than that of the whole community. It was 5.9 in Georgetown in 1903 and only 2.9 in 1920; the latter figure, though high, representing a very marked drop in such a short period. It is clear that British Guiana is taking the tuberculosis problem seriously, and that her efforts are meeting with a satisfactory measure of success.

S. L. C.

FONTES (A.). **Prophylaxia da tuberculose.—Brazil Medico.** 1921.
July 2. Year 35. Vol. 1. No. 27. pp. 344-350. With 4 text
figs. July 23. Year 35. Vol. 2. No. 2, pp. 13-19. And
Sept. 3. Year 35. Vol. 2. No. 8. pp. 98-102.

This highly valuable paper is written from the point of view of one who has taken a comprehensive survey of the whole field of

the epidemiology of tuberculosis, and who brings to the study of the question a wide knowledge of the literature of this disease, as well as a close practical familiarity with its manifestations in man and animals throughout the world. He has no illusions as to the efficacy of the conventional methods of the general sanitarian in the war against tuberculosis. The fall in the mortality from this disease, that has been such a marked feature of its epidemiological history from 1800 onwards, he explains on the grounds of acquired immunity, and he takes pains to point out that the diminution was already well advanced several years before there was any real system of public health administration in being. He deals severely with the suggestion that the isolation of infected individuals can ever be applied with sufficient thoroughness to be effective, and the arguments that he uses are somewhat as follows:—

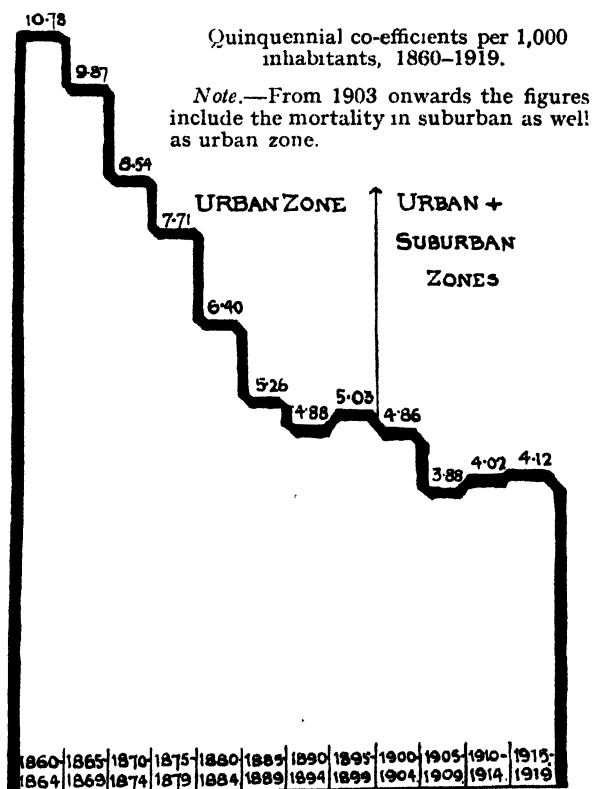
“ Von Pirquet ” tests and P.M. statistics indicate that nine-tenths of the population of large towns are infected with tubercle bacilli. Of these, it must be supposed that at least 50 per cent. disseminate bacilli in the sputum or otherwise. Taking Rio de Janeiro as an example, with a population of 1,157,873 inhabitants, at least 1,042,085 persons are likely to be infected, from amongst whom about half, or 521,000, are in all probability excretors of the germ from time to time. Is it reasonable, he asks, to advocate the isolation of over 500,000 people in order to go some way to lessening the 4,500 deaths caused annually by the disease in the town of Rio.

Without quite accepting the validity of the induction as regards the actual numbers assumed to be infected and infective, there can be no doubt that the general line of the argument is sound. The carefully supported statements of CALMETTE at the recent International Conference on Tuberculosis in London have called attention to the importance of the excretion of tubercle bacilli in the stools of a large number of apparently healthy persons, and it is certain that the numbers of “ open cases ” do not by any means represent the whole of the active disseminators of tuberculous infection. In his desire to expose the futility of some of the more widely advocated measures of prophylactic administration, the author sometimes goes too far. We think that his criticism of the regulations making notification of cases compulsory is unsound. This measure lies at the root of sound preventive measures, as it gives an approximate measurement of the problem and affords facilities for the examination of “ contacts ” and the removal of young children from a dangerous environment. Reproductions of two Anti-tuberculosis Decrees, one dating back to 1733 and the other to 1767, serve to illustrate the fact that we had “ general sanitarians ” as long as 200 years ago, and that what they advocate now they advocated then. Dr. Fontes draws a sharp line of division between tuberculous infection and tuberculous disease. Nine-tenths of the population, he says, of civilized communities are infected. Only a relatively small number show signs of the disease. He finds insensibility to the virus a sign of relative immunity to the disease, and recapitulates the oft-quoted instances of the ravages of tuberculosis when introduced for the first time into communities free from previous infection and representing “ virgin soil.” A chart illustrating the steady fall, down to its present (still high) level, of mortality from tuberculosis in Rio de Janeiro is of considerable interest and is here reproduced.

In the second portion of the paper the tuberculosis of childhood and adolescence receives attention, and the different types of

clinical manifestation of the disease in the varying age-groups, as well as the mortality in relation to age, are dealt with in a very thorough manner. The increase of the mortality from tuberculosis associated with advancing years is confirmed by extracts from the statistical studies of many authors. The question of heredity and hereditary predisposition is discussed, and the view is taken that the increased mortality amongst the children of infected parents is associated with infection at a susceptible age rather than with an inherited disposition, but the possibility of a transmission of resistance to infection as an inherited character is looked on with more favour.

Mortality from Tuberculosis in Rio de Janeiro.



Discussing the infection of adults, the author points out that the breaking down of resistance and the appearance of active disease is not always due to reinfection, but often attributable to alcohol, self-indulgence, acute infectious diseases, and so on. Much stress is laid upon the results that may be expected to follow education of the masses in personal hygiene, and the wise proverb is quoted: "Onde nao entra o sol, entra o medico; e onde nao penetra o ar, penetra a morte." (When the sun is shut out, the doctor comes in; if the air is kept out, death enters.)

In the number of 3rd September Dr. Fontes concludes his observations upon tuberculosis and deals with the question of

prevention. Having in view the extremely wide diffusion of the disease, tuberculous infection may, in the opinion of the author, be regarded as practically universal amongst those who pass their lives in urban communities, and for this reason resistance acquired through involuntary immunization amounts to a preponderating factor in the defence against the development of phthisis.

Dr. Fontes draws from this conception the natural inference that preventive measures should be directed for the most part to the protection of the still susceptible groups of children and adolescents. He advocates a much larger measure of assistance for the mother during the period of gestation and a more efficient system of puericulture. His opinion of existing methods of education in the elementary schools of his country is not high, and he is in favour of radical changes directed to the production of healthier minds in healthier bodies. In order to deal scientifically with the tuberculosis problem, he suggests a comprehensive scheme for the classification of school children on a basis of tuberculin tests followed by careful clinical investigation, illustrating his idea by means of a formidable diagram. While we agree with his scheme in a general way, we fear that it is too theoretical to be of much value in actual school hygiene. It is undoubtedly true that all school children should be submitted to the von Pirquet reaction at intervals, and that the information so gained should be applied in the direction of closer observation and the provision of more open air and shorter hours of work for those that show an early "positive" response; but there is a danger that this test may lead to groundless alarm and undue interference with education unless the supervision is in very wise and capable hands, and we are not optimistic as to the prospects of its judicious interpretation by the average schoolmaster or schoolmistress.

The paper finishes with an ambitious suggestion for the creation of a "Supreme Council of Prophylaxis and Assistance," and here, too, we feel that the author is rather inclined to see visions and dream dreams. But nothing great is ever accomplished without imagination, and perhaps the future may see the initiation of public bodies with programmes of ideal perfection and constituted of human beings worthy of the task. In the meantime, Dr. Fontes is to be congratulated on a very able and thoughtful paper. With his general arguments and recommendations all students of tuberculosis must agree. "Let us make war on the germ," he says, "but, above all, let us ensure sound men for the future of our race by preserving and developing the infants of to-day." These are words of wisdom, and we only wish that they were printed in letters of fire over the offices of every sanitary authority.

S. L. C.

DAVIES (Caleb). **The Value of Sodium Morrhuate and Sodium Linate in Tuberculosis and Leprosy.**—*Indian Med. Gaz.* 1921. Aug. Vol. 56. No. 8. p. 283.

The author has used sodium morrhuate and sodium linate in the treatment of both tuberculosis and leprosy, and believes that he has obtained satisfactory results. In the short paper now under consideration he speaks chiefly of his results in tuberculosis, which appear to have been favourable, and he notes the fact that he observed what he judged to be focal reactions in some of his cases after the morrhuate.

With the linate, the result seems to vary a great deal with different batches of this preparation, some samples proving quite non-irritant in the hands of the author, though Sir Leonard ROGERS reports that he found that the linate used by him was irritating when given subcutaneously. The same would appear to apply to the morrhuate.

S. L. C.

LINDENBERG (Ad.) & RANGEL PESTANA (Bruno). **Chemotherapeutische Versuche mit Fetten an Kulturen säurefester Bacillen.**—[Chemotherapeutic Experiments with Fats on Cultures of Acid-fast Bacilli.]—*Ztschr. f. Immunitätsf. u. Experim. Therap.* 1 Teil Orig. 1921. Vol. 32. No. 1. pp. 66-86.

This highly interesting and important paper commences with a short account of previous work on the use of chaulmoogra oil and allied preparations which is, in one respect, curiously incomplete in that it omits any mention of the researches of Sir Leonard ROGERS and his co-workers in India. It is remarkable, too, that although sent for publication at the end of November, 1920, this paper fails to notice the work of WALKER and SWEENEY on a very similar aspect of the leprosy problem published in the *Journal of Infectious Diseases* in the preceding March. [See this *Bulletin*, Vol. 17, p. 277.] It would seem that the limits set to the study of current literature by the racial animosities of the war have not yet been entirely got rid of. The authors, wishing to obtain a preparation suitable for intravenous injection, proceeded as follows:—To a 2·5 per cent. solution of soap of chaulmoogra oil was added an equal volume of the original oil itself, the mixture being made in small volumes at a time, with careful shaking during the process. The whole was now diluted by the addition of an equal volume of distilled water, then passed through a Berkfeld filter and, finally, sterilized in the autoclave. A stable emulsion, seen under the microscope to consist of discrete elements, the smallest of which were of the size of pyogenic cocci, was thus obtained, and used with marked success in the treatment of leprosy. Notes of four striking cases are given. At this point an observation was made as to the content of the filtrate in free fat, and it was found that this had dropped from 7·7 per cent. before filtration to 4 per cent. after passing through the Berkfeld. It was evident that the greater part of the oil had been taken up by the filter. From the fact that the first filtrate still retained its therapeutic activity unaltered and that only the salts of the fatty acids remained constant after filtration, the authors drew the inference that the latter (actually the sodium salts of the fatty acids) represented the active part of the emulsion. This conclusion was confirmed by further experiment, and the authors now decided to attempt to work out the degree of activity by experiments *in vitro*.

To meet the difficulty presented by the fact that the leprosy bacillus has not yet been isolated, they undertook their experiments with other organisms of the acid-fast group, thinking, in view of the group action of salvarsan on spirochaetes and of antimony on trypanosomes, that the results with one acid-fast would probably represent those with the others. In the experiments now undertaken, a 1 per cent. solution of the sterilized fatty acid under examination was set up in a diminishing series of dilutions with glycerine broth, in tubes containing 10 cc., to each of which an equal volume of bacillary emulsion was added.

Suitable controls were carried out and the tubes examined at intervals to see whether growth had taken place. In this way it was proved that the fatty acid of *Taraktogenus Kurzii* prevented the growth of avian tubercle bacilli in a dilution of 1 in 100,000, while phenol, tricrosol, and resorcin had practically no effect in comparison, Potassium aurocyanide, however, was shown, as previously demonstrated by KOCH, to be even more active. Further experiments showed that this action of the fatty acids was demonstrable for human tubercle bacilli, the butter bacillus, Duval's bacillus and the Timothy grass bacillus, but that these acids were without effect on such germs as *B. anthracis*, *B. subtilis*, *B. typhosus* and others. In this, the work of the authors confirms the observations of WALKER and SWEENEY.

They now proceeded to examine the activity of other fatty acids of the chaulmoogra series and found them all effective, but that of *Hydnocarpus wightiana* least of the group. An interesting point is that, in opposition to the findings of WALKER and SWEENEY, they obtained complete arrest of the growth of acid-fast bacilli with cod liver oil. This finding is in line with the clinical observations of Sir Leonard ROGERS and, if confirmed, may prove of importance. Oil of bacon fat, cacao, oil of cocoa nut and pea oil were all found to be inert, while oil of cotton seed, linseed, poppy and, to a less extent, sesame were found active, as was also *Johanesia princeps*. The authors now arrived at the fact, already noted by others, that it was the unsaturated fatty acids that were the active ones in preventing the growth of acid-fast bacilli, but, while associating this character with molecular structure, they make no mention of the observations of F. B. POWER, whose researches have thrown so much light upon this point. They publish an interesting note on the action of these preparations in tuberculosis and find that there is always a reaction as manifested by a rise of temperature and increased cough. They sound a note of caution in the use of these drugs in advanced cases. In its effects on acid-fast bacilli they find an explanation of the specific action of cod liver oil in tuberculosis.

This paper is a valuable contribution to a subject that is daily assuming more importance through its bearing upon the treatment of diseases caused by acid-fast bacilli.

S. L. C.

SHAW-MACKENZIE (J. A.). **On the Mechanism of Immunization, with Special Reference to Lipase.**—*Jl. Trop. Med. & Hyg.* 1921. June 15. Vol. 24. No. 12. pp. 161-164.

The author holds the view that an increase of lipase or fat-splitting ferment in the tissues is a factor in the defence of the body in cancer and certain bacterial diseases. He notes with interest the application of the unsaturated fatty acids of the chaulmoogra series and of sodium morrhuate to the treatment of leprosy and tuberculosis by Sir L. ROGERS and his co-workers because he thinks that the beneficial results may be due to the stimulation by these preparations of the lipolytic activity in the tissues and to the destructive action of the lipolytic ferment on the fats and lipoids of acid-fast bacilli. To show that the gynocardate and morrhuate really bring about an increase in lipolytic activity, the author carried out the following experiment, in which the lipolytic activity is estimated by the amount of decinormal potash required to neutralize the fatty acids set free by pancreatic lipase acting on olive oil emulsion. 1 cc. of glycerine

extract of pig's pancreas diluted with 2 cc. of water and 5 cc. of olive oil emulsion were used alone and with the addition of the substances to be tested. The mixture was incubated at 37° C. for about 18 hours and then titrated, phenolphthalein being used as an indicator. The results are thus set forth :—

	cc.	N/10 KOH required. cc.
Pancreatic extract alone on olive oil emulsion	—	24·7
Addition of sod. oleate to extract	1·0	37·9
	2·0	39·5
„ „ morrhuate	1·0	37·4
	2·0	39·6
„ „ gynocardate	1·0	35·2
	2·0	37·4

“ It will be seen that all three salts exert marked accelerating action on the lipase of extract of pancreas.” Dr. Shaw-Mackenzie has tried the treatment of active pulmonary tuberculosis by the intravenous injection of common animal soap in doses of 2 cc. of 2 or 3 per cent. solution, and he mentions the good results believed to have followed a similar kind of treatment by Dr. Dundas IRVINE and Dr. C. W. ANDERSON. The paper is interesting and suggestive.

S. L. C.

LEPROSY.

LEGER (Marcel). **La lèpre dans les colonies françaises.**—*Ann. de Méd. et de Pharm. Colon.* Paris. 1920. Dec. Vol. 18. pp. 109-137. With 3 text figs.

This extremely interesting paper gives a comprehensive account of the distribution of leprosy throughout the colonial possessions of France. The material is arranged in a series of sections dealing successively with the French Colonies in Asia, Africa, America and Oceania. The disease is common in Tonkin, Cochinchina, Annam, Cambodia, Laos, and in the French territories of India. It is interesting to read that in Tonkin the natives, clearly recognizing that leprosy is transmissible from man to man, and regarding it as incurable, had for many years set aside special villages for the accommodation of cases. These villages included, in addition to huts for the inhabitants, rice-fields, fish-ponds and cultivated land on a scale intended to make the community self-supporting. The French administration, making full use of this system as a line along which anti-leprosy precautions might be further developed, has brought into existence "agricultural colonies" for all those cases whose means are insufficient to ensure adequate isolation and supervision in the domicile. The dominant idea in framing rules for the regulation of lepers has been to meet the native sentiments and to retain the goodwill of the inhabitants.

Turning to the African colonies, the author describes the distribution of the disease in French West Africa, including Mauretania, Haut Sénégal and Niger, Sénégal, Guinea, the Ivory Coast and Dahomey; French Equatorial Africa, with the mid-Congo and Chad provinces, as well as the recently acquired Cameroons; and French East Africa, including Madagascar, the Comoro Archipelago and Réunion. Leprosy is endemic in all these areas, though the incidence varies from an inconsiderable number, as in Mauretania, to 50 or more per 1,000 of the total population, as in parts of Senegal. In the village of Kissi, in Guinea, there are reported to be actually 48 cases amongst 150 inhabitants, or 320 per 1,000. With the exception of Madagascar, it may be said that none of these African dependencies possesses any satisfactory system of dealing with lepers. The African native has little liking for the restrictions of leper colonies, and there is no marked native prejudice against the association of the infected with the healthy. But in Madagascar there had been a clear recognition of the disease long before the French occupation, and under Ranavalona II an edict had been published directing that lepers should be isolated in special locations. General GALLIENI introduced extensive measures of isolation under conditions favourable to the patients, and this system has progressed until, in 1914, there were 4,021 interned patients out of an estimated total of 6,373 cases in the population of the island. In Réunion, where legislation, though of doubtful quality, has existed since 1852, the rules have invariably been evaded.

After a brief mention of the disease as it occurs in the French-American Colonies of the Antilles and French Guyana, the author passes on to a consideration of the colonies of Oceania, and here the subject takes on a new interest, since the history of leprosy in New Caledonia affords an opportunity of watching the behaviour of the disease in virgin soil. Introduced fifty-five years ago by a Chinaman, whose medical history has been well investigated by GRALL, leprosy spread

with such rapidity that, at one time, it threatened the inhabitants with extinction, even spreading to the Europeans, until 25 per 1,000 of these in the penal settlement and 14 per 1,000 in the free white population were affected. The efforts at the framing of anti-leprosy measures appear to have met with very little success. In spite of this, LEBOEUF, who carried out a careful survey of the distribution of the disease in 1911, 1912 and 1913, was able to draw the very encouraging conclusion that the disease was now undergoing a genuine diminution.* After an epidemic outbreak, following the introduction of the infection from elsewhere, the disease has tended to limit itself, while the infective nodular type has become less common and the anaesthetic form relatively more frequent. It is hard to avoid the conclusion that some degree of relative immunity has been acquired by the inhabitants, leading to the manifestations of the disease in its less virulent form of nervous leprosy. This idea is supported by the findings of VIALA in the Wallis Islands, where he "encountered very few cases of nodular type, but found that there existed in about half the population a form of attenuated leprosy, of which the chief signs were atrophy of the muscles of the hand and thickening of the ulnar nerve."

There is no more interesting feature in the history of leprosy than the fact that the disease has practically disappeared from Europe after a wide distribution in the Middle Ages, and that this disappearance had already taken place before modern hygiene had advanced sufficiently to be cited as the cause. The importance of this tendency to self-limitation in the spread of infective disease is very great. It is for this reason that, with reference to both leprosy and tuberculosis, the course taken by these diseases in New Caledonia merits the closest study by the epidemiologist.

S. Lyle Cummins.

DA MATTA (Alfredo). **Notas sobre a lepra no Amazonas.**—*Brazil Medico*. 1921. June 4. Year 35. Vol. 1. No. 22. pp. 287–291.

The author begins by expressing the truth that in discussing the transmission of leprosy two possible modes of infection have to be considered, the one problematical and in need of further investigation—that in which the intervention of an insect carrier is postulated, and the other well established and beyond doubt—the direct passage of the disease from person to person. A very complete summary, which we need not attempt to reproduce, is given of previous investigations as to insect vectors of Hansen's bacillus. The author, while admitting the weight of some of the evidence adduced, notably the researches of LEBOEUF with insects such as *Musca domestica*, as well as with fleas and bed-bugs, wisely preserves a critical attitude, remarking that if any of the more common insects were an effective transmitting agent, leprosy would spread far and wide in the valley of the Amazon.

Turning to direct contagion from man to man, Dr. Da Matta lays stress on the long time that may pass before exposure to infection finally leads to clinical manifestations, eight or ten years being often necessary. He points out, however, that an advanced case of leprosy is a very formidable focus of infection, the bacilli being disseminated in the nasal secretion, the saliva, the vaginal mucus, the discharges

*For summaries of Leboeuf's papers see this *Bulletin*, Vols. 1, 2, & 3.

from the open sores, the sweat, tears, faeces, etc. Methods of prophylaxis, then, must be based on the following schematic lines :—

1. Elimination of foci—isolation { domiciliary.
in leprosariums.
2. Restrictions on the immigration of lepers.

A brief historical account of the measures taken to prevent leprosy in Manaos follows, and the author gives some statistics collected from the records at the Lepers' Home at Umirisal. These figures deal with 131 cases, of which 103 were males and 28 females. The age distribution was as follows :—

Under 10 years	..	..	..	..	..	4
11-20	..	..	..	..	..	18
21-30	..	..	..	..	..	32
31-40	..	..	..	..	..	31
41-50	..	..	..	..	..	24
Over 50	..	..	..	..	..	22
						131

The clinical types were as under :—

Nodular	..	..	..	40	or	32	per cent.
Anaesthetic	..	..	..	48	..	36.6	..
Mixed ..	..	..	..	20	..	15.2	..
Trophic	..	..	..	12	..	9.1	..
Doubtful	..	..	..	11	..	8.3	..

The paper ends with a warning against an equivocal or perhaps erroneous statement often made as to the extreme prevalence of horrible and revolting cases of leprosy in the valley of the Amazon. As the author wisely points out, recent investigation has shown that many of the more terrible conditions of loss of naso-labial tissue and deep cutaneous lesions are due to *Lcishmania americana* and to blastomycosis. Leprosy, though a very important item in the pathological picture of the country, is not so prevalent as is commonly supposed, being actually rare in parts of the interior.

S. L. C.

ALCAZÁR (Izak). **A Study of Leprosy in the Holy Land.**—*Boston Med. & Surg. Jl.* 1921. May 19. Vol. 184. No. 20. pp. 518-521. With 4 text figs.

This paper gives a vivid account of the lepers in Palestine, and, while not attempting to deal closely with the medical problems of the disease, holds the interest of the reader through its sympathetic and humane attitude towards the social and historic aspects of leprosy. During the Turkish regime, lepers were allowed full freedom outside the walls of Jerusalem, and a regular leper community lived for many years in a cave on the slopes of the Mount of Olives near the village of Siloam. Their means of subsistence was by the collection of alms from tourists, and their operations were conducted on a definite plan under the direction of a chosen chief. They lived a communal life, marrying amongst themselves, making common arrangements for the division of their spoils and the purchase of food, and submitting all disputes to their leader, whose decision was final. As we read this brief account of a curious human agglomeration we cannot avoid being impressed

with the idea that this solution of the leper problem by the lepers themselves, may, after all, be the best and happiest arrangement. Better, perhaps, the "laissez faire" of the Turks than the leper islands and isolation establishments of less fatalistic peoples!

S. L. C.

HIJIYA (S.) & SAKAMOTO (M.). **Das Leprosorium in Gotemba.**—*Japan. Ztschr. f. Dermat. u. Urol.* 1920. Sept. Vol. 20. No. 9. pp. 777-789. With 10 illustrations. [German summary p. 71.]

This is a brief account of the situation and organization of the Leprosorium of Gotemba, and gives no particulars as to the clinical side of the work in hand. The institute is placed at the foot of Fuji mountain at an elevation of about 300 metres above sea-level in an isolated and very healthy locality. First started by a French missionary named TESTWID in 1889, it has dealt with 541 lepers (493 males and 138 females) to date; there are at present 70. The "mixed" type is predominant. The patients, other than those severely affected, are kept occupied with indoor and outdoor work of a suitable kind.

S. L. C.

ASANO (Buichi). **Die Verteilung und die Statistik der Leprakranken in der Gegend von Aichi-distrikt.**—[Distribution and Statistics of Leprosy in and around Aichi Prefecture.]—*Hifuka oyobi Hinyōkika Zasshi (Japan. Ztschr. f. Dermat. u. Urol.* 1920. Sept. 20. Vol. 20. No. 9. pp. 789-806.

This is the result of the studies of the cases recorded in the Aichi Hospital of Nagoya, during the past ten years, November 1909-October 1919. The lepers dealt with are 814 in number, of which 79.4 per cent. are men and 20.5 per cent. are women. The majority of the patients belong to the "macular" type, being 424 in number (52 per cent.), while the "tubercular" and "mixed" types are the smallest groups, being each 44 in number (5.4 per cent.). The remainder belong to the "nervous" type.

As to the peculiar feature that the exposed parts of the body are those found mostly affected, and that the germ cannot grow on artificial culture media, the author suggests that the presence of light and the stagnation of venous blood may be necessary conditions for the growth of the germ, which latter seems to be aerobic in nature. The ages and occupations of the patients and the districts whence they came also receive consideration.

Hiroshi Ohshima.

YAMAMOTO (Tatsukichi). **[Influenza Epidemic among Lepers (Double Infection).]**—*Tokyo Iji Shinshi (Tokyo Med. News).* 1920. Feb. 21. No. 2165. pp. 379-385.

The paper deals with the relation between leprosy and the influenza epidemic which prevailed in the autumn of 1918. Among 327 lepers under consideration there were 262 cases of influenza (80 per cent.) during the year beginning October 26th, 1918. Death occurred in 34 cases (less than 15 per cent.). Thus it seems that there exists no

difference in susceptibility to the epidemic between lepers and healthy people. The death-rate of less than 15 per cent. does not seem to be especially high. But as no reliable figures have yet been given as to the corresponding rates among healthy people, it would be premature to draw any definite conclusion.

Hiroshi Ohshima.

PERRET (J. M.). **Report on Two Cases of Leprosy.**—*New Orleans Med. & Surg. Jl.* 1921. May. Vol. 73. No. 11. pp. 473-475. With 1 text fig.

"Dyer in 1898 estimated the number of lepers in Louisiana as being between 300 and 500"—(OSLER). The author concludes that there are probably more cases at the present day. He thinks that many are going about undiagnosed, and, as a matter of fact, actually found three cases in one day on visiting a dermatological clinic. In the present paper he describes two cases, both Louisianians, neither having ever left the United States. Good photographs are given. It is pointed out that the Wassermann reaction is often strongly positive in leprosy, and the author advises that leprosy should be suspected in cases with a positive Wassermann and yet with lesions that do not clear up with anti-syphilitic treatment.

S. L. C.

STEPHENS (J. W. W.) & ADLER (S.). **A Case of Suspected Leprosy.**—*Ann. Trop. Med. & Parasit.* 1921. July 16. Vol. 15. No. 2. pp. 173-177. With 2 text figs. and 1 plate.

This is a brief though very interesting account of a case of a patient who had, though born in England in 1904, resided in Capetown from 1905 to 1920. The symptoms and signs are well described and are those of maculo-anaesthetic leprosy. It is a matter of great interest that a very thorough search has so far completely failed to show the presence of acid-fast bacilli, though both scrapings and sections of tissue removed for the purpose have been investigated. In the excised portion of the enlarged and thickened ulnar nerve Prof. E. GLYNN reports the presence of three caseous areas, apparently corresponding to large nerve bundles and surrounded by fibrous tissue in process of formation, an appearance quite consistent with fibro-caseous leprosy.

We are inclined to think that the clinical and histological findings justify a positive diagnosis and appropriate treatment.

S. L. C.

CUSSEC (Jean). **Sur les caractères de l'anesthésie dans la lèpre.**—*Arch. Méd. et Pharm. Nav.* 1921. July-Aug. Vol. 111. No. 4. pp. 303-312.

This valuable contribution to the neurology of leprosy is a summary of observations made on 60 Senegalese soldiers embarked on the hospital ship "Flandre" for repatriation from Marseilles to Dakar, after having developed signs of leprosy during war service in France. Nine typical cases, illustrating an ascending scale of severity and a progressive series of clinical pictures, are chosen for noting in detail, after which the author gives an interesting résumé of the opinions as to the anaesthesia of leprosy enunciated by such authorities as LE DANTEC,

JEANSELME, P. MANSON, BRISSAUD and DÉJERINE. The conclusions of Dr. Cussec himself are as follows:—

" It would appear, then, that the anaesthesia of leprosy is caused by a degenerative neuritis of bacillary origin spreading, on the one hand, superficially along the skin and affecting more and more of the nerve terminations in its course, and, on the other hand, taking a deep course by ascending the nerve fibres themselves, finally reaching the roots and gaining the posterior horns of the spinal cord. At this level, the lesions affect that portion of the grey matter of which the cutaneous ' projection ' is that of the corresponding posterior nerve roots. As a matter of fact, numerous lepra bacilli have been demonstrated in these situations, where their presence has led to sclerosis and the formation of fibrous nodules, with ultimate atrophy of nerve tissue "

S. L. C.

AGRICOLA (Ernani). **Da punção ganglionar no mal de Hansen.** [Gland Puncture in Leprosy.]—*Thèse de doctorat, passée devant la Faculté de Bello-Horizonto, Etat de Minas Geraés, Brésil.* 80 pp. Typ. Ariel, Bello Horizonto.—[Summarized in *Bull. Inst. Pasteur.* 1921. Mar. 30. Vol. 19. No. 6. pp. 195–196.]

The author describes an investigation in which the lepra bacillus was sought for in the superficial glands of 19 patients suffering from the disease. The findings were positive in no less than 12 of these cases. Further, an examination of gland pulp from two other persons free from symptoms or signs of the disease, but closely associated with known or suspected cases, led to the finding of the bacilli, and thus rendered possible a diagnosis at a moment when clinical examination afforded no information.

Impressed with the importance of these observations, the author suggests that every suspected case should be submitted to this test. He classifies cases of leprosy into "glandular," "nervous," "cutaneous" and "mixed."

[Although most students of leprosy will agree that this classification is rather premature, the work on which the author bases his paper is highly interesting and suggestive, and confirmation by other observers will be awaited with interest. See LEBŒUF, this *Bulletin*, Vol. 1, p. 191.]

S. L. C.

BRUUSGAARD (E.). **Bidrag til Kjendskapet av den saakaldte tuberku-loide lepra.** [Contribution to the Knowledge of the So-called Tuberculoid Leprosy.]—*Norsk. Mag. f. Laegevidensk.* 1921. Vol. 82. No. 5. p. 359.

The case was that of a woman, 65 years of age. She had a skin affection, chiefly on the distal part of the left hand and foot, consisting of multiple disseminated patches of reddish-brown infiltrated papules, soft in consistence, which on pressure with a glass spatula left yellowish-white foci. It much resembled multiple disseminated lupus. The W.R. was negative. In addition she had marked atrophy of the muscles of the left hand, with consequent paresis. The nails were thin and flat. The ulnar nerve was felt to be thickened. She complained of shooting pains in the hand. X-ray examination showed marked atrophy and calcification. Although the diagnosis of the skin lesion was difficult, paresis of the hand and swelling of the ulnar nerve pointed to leprosy. It did not conform to the maculo-anaesthetic

type, but with its lupus-like appearance it was undoubtedly a case of JADASSOHN'S tuberculoid leprosy. In sections of the skin undoubtedly leprosy bacilli were not to be found, only a granular acid-fast rod here and there in the protoplasm of the connective tissue cells. Tuberculosis was excluded by an injection of tuberculin, and the inoculation of guinea-pigs with an extract of the skin. A microscopic examination of the ulnar nerve showed the same granulation tissue as in the skin, but no typical giant cells or necrotic foci. This supplements JADASSOHN'S description of this form of the disease. Although the patient received no treatment she got much better. In the course of two years no new lesions of the skin appeared and the old ones were partially or wholly absorbed. The neurological examination gave about the same result as when she was admitted to hospital. Her general condition was excellent. The tuberculoid form of leprosy is perhaps the form *par excellence* in which the patient most easily overcomes the disease, and possibly in a shorter time than is the case with the maculo-anaesthetic type, to which it is most nearly related. On account of its characteristic clinical picture and its rarity it is advisable to look upon it as a distinct variety of the disease; otherwise it will be easily overlooked in practice. This is the first case of tuberculoid leprosy reported in Norway.

E. E. Atkin.

KOHDA (K.). **On the Cultivation of *Bacillus leprae*.**—*Kitasato Arch. Experim. Med.* 1921. Mar. Vol. 4. No. 2. pp. 141-158; and *Sei-i-Kwai Med. Jl.* 1921. Mar. Vol. 40. Nos. 1-2. (Whole Nos. 456-457.) pp. 1-15.

This work consists of two parts, the first being concerned with the morphological and cultural characters and the results of animal inoculation with the Kedrowski bacillus. A strain of this organism, brought to Tokyo from Breslau by Prof. DOHI, was carefully tested by the author, who records his results in the paper now under review. In the main, the results obtained are comparable with those recorded by others, but Kohda found no evidence of the formation of streptothrix forms in his subcultures, and the acid-fast character was always retained at the same level. Inoculation into guinea-pigs, rabbits, rats and mice showed that, if given in sufficient quantity, the organism was capable of bringing about pathological conditions of a subacute order, and, in some instances, even death. In none of the animals were symptoms like those of leprosy produced, except that in the case of one of the rats there was loss of hair. The second part of the paper discusses experiments carried out to test the antibody content of the blood of lepers for antigen derived from Kedrowski cultures. It was shown that agglutinins were present in four out of ten cases in low dilution, but avian tubercle bacilli were also agglutinated. In complement fixation tests, 33·3 per cent. of the sera were positive both to the Kedrowski and the avian strains. The work in no way points to the Kedrowski bacillus as the cause of leprosy.

S. L. C.

HOOPER (Philip). **The Symptomatology and Treatment of Leprosy.**—*Jl. Trop. Med. & Hyg.* 1921. May 16. Vol. 24. No. 10. pp. 137-140. With 1 chart in text.

This is a good clinical paper, in which an interesting account is given of the frequency of various symptoms in a series of 41 cases under

observation at Makogai Leper Asylum in Fiji. Important items in this analysis are the positive findings in 21 out of 41 single examinations of nasal mucus for acid-fast bacilli, the finding of 23 from the total with glandular enlargement, the observation that nerves may be enlarged without any marked symptoms of modification in sensation or power, and the discovery of anaesthetic patches independent of macules or nerve lesions in 30 cases. The author finds it possible to give crude chaulmoogra oil intravenously in doses of 15 minims daily for six days a week for months on end without ill effects. Of 40 cases so treated, only two failed to derive benefit from the drug. There is a rise of temperature and pulse after the injections, lasting about eight hours. A table is given showing the total amount of oil given, the number of injections, the weight at the commencement of treatment and at the end of the year, and the age and type in each of the 40 patients treated. It is to be noted that nine of these cases were at an age when weight is usually gained through natural growth, except in very advanced cases. Of the 40 patients concerned, 25 gained weight, 11 lost and 4 remained stationary. It would be necessary to know much more about each individual case before drawing any conclusion from this table, but the paper is written with knowledge and conviction, and we get the impression of a very successful effort in treatment more from the article itself than from this table of weights.

S. L. C.

JEANSELME (E.). **Rapport sur une nouvelle méthode de traitement de la lèpre, instituée par le Dr. Harry T. Hollmann, présenté au nom de la Commission permanente de la lèpre.**—*Bull. Acad. Méd.* 1921. Mar. 29. Vol. 85. No. 13. pp. 393-395.

The author, in this paper, brings to the notice of the Académie de Médecine a memoir by M. MARQUES, French Consular Agent at Honolulu, received through the Minister of Public Instruction, in which the work of Dr. Harry T. HOLLMANN in the treatment of leprosy by means of the fatty acids of chaulmoogra oil and their ethyl esters, already reviewed in this *Bulletin* [Vol. 15, p. 272], is described, together with a summary of the method of preparation and use, and the results obtained. It is curious to find all reference to the investigations of Sir Leonard ROGERS and his co-workers omitted in the presentation of a report on what is described in the title as a new treatment. The paper is written with great lucidity, and is to be recommended to those who desire to find a clear description of technique.

S. L. C.

HORTA (Parreiras). **Prophylaxia e tratamento da lepra.** [Prophylaxis and Treatment of Leprosy.]—*Rev. Med. Chirurg. do Brazil.* 1921. Feb. Vol. 29. No. 2. pp. 67-71.

The author, aided by two friends, the chemists Paulo GANNS and Dias da CRUZ NETTO, who prepared for him the ethyl esters of the fatty acids of chaulmoogra oil, has tried these preparations in the treatment of leprosy, with very satisfactory results. The preparation produced by these workers on the lines indicated by the researches of HOLLMAN and DEAN, has been called by them "Chaulmougrol," and would appear to be, on the whole, more powerful than that of the American scientists, and to lead to reactions of a characteristic kind. Its use is followed by cure in a high proportion of cases, lesions drying up and the

bacilli disappearing from the discharges and from the tissues. Speaking of the all-important question of prophylaxis, the author commends the zeal with which the Public Health Service is dealing with this problem, but he hints that the proposed provision of leprosariums and leper colonies will be very costly, and that it will hardly be possible to afford more than the construction of two or three such institutions in the next few years; probably not enough to accommodate the native lepers, the disease being very common in Brazil. He points out that the discovery of a specific cure places a valuable prophylactic measure at the disposal of the Sanitary Authorities, as the treatment and cure of cases at dispensaries will cheaply and surely eliminate foci of infection.

S. L. C.

DE MELLO (Froilano). **Traitement de la lèpre.**—*Presse Méd.* 1921. Oct. 29. No. 87. p. 861.

In this memorandum de Mello reiterates several of his conclusions already published [see this *Bulletin*, Vol. 17, p. 282] and adds certain details as to cases treated since his last communication. He speaks with optimism as to the advances now being made in the treatment of leprosy with the unsaturated fatty acids of chaulmoogra oil and also hints that there is a greater field for work in connection with K. K. CHATTERJI's investigations into the properties of oil of "Nim," the indigenous name for the margosa tree or "Cuddo Nimb" (Hindustani). He strikes a note of caution as to the use of the word "cured" for cases diagnosed leprosy in whom, under treatment, the lesions have totally disappeared and the lepra bacilli ceased to be demonstrable in the sites where the lesions existed or even in the nasal secretion after the use of iodides; but the fact that this state of apparent freedom from disease has been known to last, already, for four years, and that the ex-patients have reassumed their places in society and their previous vocations, gives good ground for the hope that such "cures" are in every way real.

De Mello finds that he can use, by intramuscular injection, solutions of gynocardate of soda up to 4, 5 and even 6 per cent. He commences with a dose of 5 cc.—but of what exact strength, 4, 5 or 6 per cent., is not stated—and finds that he can raise the dose to 12 cc. with safety. He is of opinion that the gynocardate pills used *per os* by ROGERS are of no value, the injections constituting the effective part of the treatment; and so he confines himself to the latter. As mentioned in our previous summary, the author finds reason to think that the fragmentation of the lepra bacilli noted by ROGERS in the nodules of cases treated with the gynocardates is of little or no significance, since similar appearances may be noted in the same proportion of counted bacilli in treated and untreated cases. He reserves the results of treatment by "Oil of Nim" for a further communication.

S. L. C.

DEAN (Arthur L.) & WRENSHALL (Richard). **Fractionation of Chaulmoogra Oil.**—*Public Health Rep.* 1921. Apr. 1. Vol. 36. No. 13. pp. 641–660. With 4 text figs.

In a brief introduction the authors review the history of chaulmoogra oil and its derivatives. Formerly thought to be the product of *Gynocardia odorata*, the oil was shown by POWER and his co-workers of the Wellcome Chemical Research Laboratories to be in reality

derived from the seeds of *Taraktogenos kurzii*, while the oils from two closely allied species of *Hydnocarpus* were practically identical. POWER showed that *Taraktogenos* and *Hydnocarpus* oils contained a new type of fatty acid, and two acids of this series were isolated and investigated. "Chaulmoogric acid melts at 68° , has an iodine value of $90\cdot1$, and shows a specific rotation of $+56$; hydnocarpic acid melts at 59° , possesses an iodine value of $100\cdot2$, and gives a specific rotation of $+68\cdot1$." In the search for a suitable form for therapeutic use, the mixed fatty acids of chaulmoogra oil, being solid at ordinary temperatures, were not convenient; the soluble salts were regarded as dangerous for intravenous use, but the ethyl esters of the fatty acids, prepared by DEAN, were found to be thin liquids suitable for intramuscular injection, being readily absorbed and well tolerated.

The results obtained with these preparations were so favourable that it became very important to ascertain whether any one of the four fractions of fatty acids used was conspicuously superior to the others, and it was therefore necessary to obtain these fractions separately in considerable quantity. The methods employed to obtain sufficient quantities of these acids in a state of purity are described in the paper under review. An attempt was first made to separate the fatty acid by crystallization from alcohol. The technique employed is described in detail, but the method was not found satisfactory and was abandoned. Attention was now turned to the separation of the fatty acids by means of barium acetate. By this means, both chaulmoogric and hydnocarpic acids were obtained pure, but, although capable of improvement, the method did not afford hopes of the production of the acids in sufficient quantities. Better results were obtained by fractional distillation of the ethyl esters under high vacuum, and this method, though for the moment abandoned in favour of a more productive technique, is promising, and will be further investigated in the future. The best results were obtained by the fractional distillation of the fatty acids themselves *in vacuo*. For the exact technique evolved the original paper should be consulted. The work has been rendered more difficult through the inferior quality of the chaulmoogra oil placed on the American market, the supply available being a dark reddish-brown oil, instead of the clear amber-coloured oil obtainable in 1919, and being found to contain the normal amount of chaulmoogric acid, but only about one third of the hydnocarpic acid formerly recovered from the lighter-coloured oil. Even from low grade oil, the method advocated will give at least 50 gms. of pure hydnocarpic, and 100 gms. of chaulmoogric acid from 1,000 gms. of mixed fatty acids.

S. L. C.

GHOSH (Sudhamoy). **Chemical Investigation in Connection with Leprosy Inquiry. Part II.**—*Indian Jl. Med. Res.* 1920. Oct. Vol. 8. No. 2. pp. 211-215.

This article, a continuation of a research by the author on the chemistry of chaulmoogra oil and some other oils closely related thereto, though of great importance, does not lend itself well to summary, as the work is of a highly technical nature and already condensed to the smallest possible space. Readers who desire to inform themselves as to the chemistry of the preparations of chaulmoogra oil are therefore referred to the original. Dr. Sudhamoy Ghosh

has also investigated cod-liver oil, and he thinks that the unsaturated fatty acids of cod-liver oil and of soya bean open up a field of research likely to yield fruitful results. It is interesting to note that, although WALKER and SWEENEY [see this *Bulletin*, Vol. 17, p. 277] found sodium morrhuate to be relatively inert in bactericidal power for acid-fast organisms, LINDENBERG and RANGEL PESTANA [see pp. 390-391 above] have found it to prevent the growth of some of the commoner bacilli of this group, and we have the researches of ROGERS, Ghosh and others to indicate that the morrhuate is of real value in the treatment of leprosy. It is to be hoped that further experiments *in vitro* with derivatives of cod-liver oil may be tried in order to settle this point.

S. L. C.

MCDONALD (J. T.) & DEAN (A. L.). **The Constituents of Chaulmoogra Oil effective in Leprosy.**—*Jl. Amer. Med. Assoc.* 1921. May 28. Vol. 76. No. 22. pp. 1470-1474.

From 1st January, 1920, to the middle of March, 1921, practically all the patients at the Kalihi Hospital have been receiving the "standard treatment" described by the authors in their previous publications [see this *Bulletin*, Vol. 17, p. 281]. Of these patients, 50 per cent. have been "paroled" after recovery. Most of the 87 patients now in hospital are comparatively recent arrivals. As the authors put it, "It would appear that we have methods in hand for holding the disease under control." In addition to the steady use of their standard method, the authors have also tried out several lines of investigation, of which three are as follows:—

1. What is the relative value of the oral administration of chaulmoogra compounds as practised in our standard treatment? The answer to this question, obtained by treating ten patients by injections alone without any oral administration except of a tonic medicine, is to the effect that the injections are just as effective by themselves and that the oral administration is merely waste of valuable medicine.

2. What are the therapeutic agents in chaulmoogra oil? By means of specially devised methods, of which the details are not given in the paper, but have appeared elsewhere (*Jl. of Amer. Chem. Soc.*, Vol. 42, 1920, pp. 2626-2645), considerable quantities of pure crystallized chaulmoogric and hydnocarpic acids were prepared, and these were converted into their ethyl esters, the latter being distilled to get them into the highest state of purity. Of ten patients, five were treated by the ethyl ester of chaulmoogric acid and five by that of hydnocarpic acid. On the whole, the latter gave the better results, but both were highly satisfactory. The authors conclude that "on a basis of these results" it may be asserted that "acids having the peculiar structure and properties of chaulmoogric and hydnocarpic acids will arrest human leprosy." By means of further research they were able to obtain a preparation with an iodine number of about 125, that is, about 35 points higher than the iodine value of chaulmoogric acid. The indications are that this is a mixture of chaulmoogric acid with a compound of the same nature as the latter but more highly unsaturated. With this preparation a group of five patients were treated, of whom three improved with unusual rapidity, one was soon paroled, and the fifth, an old man who was very irregular in taking injections, was allowed to drop out of the series.

3. Experiments proved that iodine is not an essential item in the treatment.

It would appear that something like 10 per cent. of the patients are unable to take injections continuously owing to a tendency to break out into swellings, "which may perhaps be a form of toxæmia." These, though not serious, interrupt the course of treatment, and investigation is desirable with a view to their prevention. This paper is a highly important one and should be read in the original.

S. L. C.

ROGERS (Leonard). **Chaulmoogra Oil in Leprosy and Tuberculosis. The Successful Treatment of Leprosy by Injections of Soluble Preparations of the Fatty Acids of Chaulmoogra and Other Oils and its Bearing on the Tuberculosis Problem.**—*Lancet*. 1921. June 4. pp. 1178-1180.

In this paper Sir Leonard Rogers summarizes the work done by him and his co-workers in India on the use of the new preparations of chaulmoogra oil. After a short review of the history of these preparations in the treatment of leprosy he explains why the hydnocarpic acid was considered to be probably the most active constituent of the oil, and explains how, through later observations, it has been found that active preparations can be made from the whole of the fatty acids of these oils without the labour of fractionation. He then passes on to the use of sodium morrhuate in tuberculosis, but confines himself to a very brief reference to the work on this substance and on unsaturated fatty acids of soya bean, which he thinks have every prospect of successful use in tuberculosis as well as leprosy in the future.

Turning to results, he quotes his contributions to the Calcutta Leprosy Conference [see this *Bulletin*, Vol. 17, p. 286], and states that the duration of treatment should be a year or more, if possible. In cases treated with the chaulmoogra acid preparations for a year or longer no less than 9 out of 13, or 65 per cent., showed complete disappearance of the lesions. Of 20 cases treated with sodium morrhuate 3 were slightly improved, 12 greatly improved, and in 5 the lesions had disappeared. The after-results of 26 gynocardic cases and 9 cases treated with morrhuate had been followed up for another year subsequent to an earlier report. In the former 5 only had relapsed, all being patients who had discontinued treatment against advice. Some of these subsequently cleared up under further treatment.

Sir Leonard lays stress upon certain statistics which seem to show that there is an especial susceptibility to leprosy infection during the first two decades of life as compared with later age.

Turning once more to treatment, the author states that the results in tuberculosis are variable, but on the whole, in his opinion, good. He further states that the treatment was harmless in the cases that had come under his observation in 1919. In this connection the results recorded by LINDENBERG and RANGEL PESTANA should be borne in mind [see pp. 390-391 above], as in their hands unsaturated fatty acids have proved to give rise to very definite reactions in cases of pulmonary tuberculosis; and there would appear to be some reason to think that caution must be used in applying the results obtained in leprosy to tuberculous infections, caused by a much more toxic type of acid-fast bacillus.

S. L. C.

CAWSTON (F. G.) ; ROBERTSON (Wm.). **Treatment of Leprosy.**
[Correspondence.]—*S. African Med. Rec.* 1921. Aug. 13.
Vol. 19. No. 15. p. 300.

Dr. Cawston, whose previous notes re the treatment of leprosy by means of "oscol stibium" have been reviewed in this *Bulletin* [Vol. 17, p. 284], writes to point out that, in view of his findings that the drug should be "pushed until toxic symptoms, such as diarrhoea, have shown themselves," the failure of smaller doses at Robben Island, as reported in the lay press, is possibly to be explained in terms of insufficient dosage. He suggests, too, that the known fact that pathogenic organisms can become antimony-fast may have a bearing on these cases. He has recently advocated the use of Thiarsol, a colloidal preparation of arsenic and sulphur, to be given after a preliminary course of treatment with antimony in leper patients.

Dr. Robertson briefly reports a case of leprosy treated initially with "606," the Wassermann reaction being positive, and subsequently with intravenous inoculations of tartar emetic, from one-fifth to one-fourth of a grain. The results were excellent. The solution used was one containing a grain of tartar emetic to the drachm, a piece of camphor being added to prevent the growth of moulds.

S. L. C.

ROUSSEL (J. N.). **Two Cases of Leprosy cured by Anthrax Vaccine.**—*New Orleans Med. & Surg. Jl.* 1921. Oct. Vol. 74. No. 4. pp. 250-252. (Discussion, pp. 253-255.)

After a few preliminary remarks as to the complete failure of all previous attempts at the treatment of leprosy from the time of Moses to the Hansen period—but without any reference to the work of ROGERS, of McDONALD, of MUIR and others with the new chaulmoogra oil derivatives—the author proceeds to describe two cases in which, under his treatment by injections of the "liquid anthrax vaccine of H. K. Mulford Co., for the immunization of animals against anthrax," a cure was rapidly obtained. In one of these cases acid-fast bacilli were demonstrated, but in what situation is not stated. In the other, attempts to find acid-fast bacilli proved fruitless. The clinical findings are recorded in such a scanty manner that it is quite impossible to judge whether the patients suffered from leprosy or not, but the author is not in any doubt upon this score. One of the cases came under notice in February and the other in March of 1919, so that not quite three years have elapsed since they were first seen; nor is there any statement that they were kept under observation after the summer of 1919.

In the discussion which followed the report of these cases at the New Orleans Medical Society, Dr. H. E. MENAGE quoted recent work and sounded a note of caution as to accepting the bacillus-negative case as one of leprosy, but, on the whole, the communication was well received. In this *Bulletin* the paper is noted merely to serve as an example of how very uncritical may be the attitude of the general practitioner of the effects of measures employed in treatment.

S. L. C.

WAYSON (James T.). **The Value of Iodin in the Treatment of Leprosy.**—*Arch. Dermat. & Syph.* 1921. Mar. Vol. 3. No. 3. pp. 248-249.

Wayson, reverting to a method of treatment used by DANIELSON and others in the period between 1860 and 1890, has tried "potassium

iodid" in leprosy and claims very good results, more especially in the nodular variety. With doses gradually increased to between 100 and 200 gr. daily, large nodules have been found to break down into ulcers and finally heal with but little scar tissue; while sensation, though lost, has been restored. These beneficial results have been obtained at the cost of considerable suffering to the patient, excruciating neuralgic pains and loss of sleep being endured, with the compensation of a decided improvement later on. The author has also tried iodine in the form of sajodin, a 32 per cent. iodine powder, in doses gradually increased to 20 gr. three times a day, and, later, iodalbin, a preparation containing 22 per cent. of iodine, with even better results. Lugol's solution, in increasing doses to 20 drops three times a day, has also been used with success. A curious development of this method, described by Dr. Wayson, consists in freezing the skin lesions of patients under iodine treatment by means of carbon dioxide snow to produce a large bulla, the contents of which are removed for use in treatment. The fluid from the bulla is regarded as containing iodine and is described as an "iodinized autogenous serum," being reinjected into the patient. Skin lesions containing large numbers of bacilli are selected for this purpose. The note is brief, and no details of the progress of treated or control cases are given, nor are the numbers of patients dealt with specified.

S. L. C.

LINDENBERG (Adolpho). **Da prophylaxia geral á prophylaxia da lepra.**—*Bol. Soc. Med. e Cirurg. de S. Paulo.* Brazil. 1920 & 1921. Oct.-Feb. Vol. 3. (2nd series.) Nos. 8-12. pp. 348-350.

The author defines certain landmarks in the history of preventive medicine, from the methods in general use in the Middle Ages, consisting almost exclusively of compulsory isolation, to which was joined, later, notification, on through the stage of "specific prophylaxis," that dawned with Jennerian vaccination, to the period of "measures of general hygiene" based on the discovery of the microbic origin of infectious disease. The disappointing results of these general measures led back to a revival of the principles of specific prophylaxis, now extended to a whole group of diseases by the use of active immunization with killed or attenuated cultures of the germs concerned. This line of activity has been supplemented by the introduction of "therapeutic prophylaxis," first used by KOCH in the attempt to diminish malaria by quinization of cases in order to reduce sources of infection to the insect host, and typically employed in the campaign against syphilis by the disinfection of cases by EHRLICH'S salvarsan. The author, for the suppression of leprosy, a disease of numerical as well as clinical importance in Brazil, advocates what he describes as "indirect therapeutic prophylaxis," that is to say, the treatment of patients at dispensaries and the admission of advanced and infective cases to sanatoria; in fact, the measures now employed in most tuberculosis schemes. This suggestion assumes increased importance in view of the fact that leprosy must now be regarded as a much more therapeutically curable disease than tuberculosis. It is quite possible that the dispensary treatment of early cases by means of the new preparations of chaulmoogra oil may yet prove to be a highly practical means of dealing with this disease.

S. L. C.

MARCHOUX (E.). **Une nouvelle maladie à bacilles acido-résistants qui n'est ni la tuberculose, ni la lèpre.**—*Bull. Acad. Méd.* 1921. Mar. 8. Vol. 85. No. 10. pp. 317-319.

The patient in question was a native of Haiti, aged 23 years, admitted to the Hôpital Pasteur under the care of Dr. Louis MARTIN and Dr. VEILLON, through whose kindness the author was enabled to investigate the case. Believed to be suffering from leprosy, the patient, nevertheless, presented certain peculiarities, since there was an absence of zones of anaesthesia and no trace of nodules. The skin, however, showed curious pigmented spots on the face and limbs, these being the result of ulcers which had followed upon bullous eruptions. Over these spots sensibility to pin-pricks and to heat was unaltered. The conjunctivae and mucous membranes were quite healthy. The diagnosis of leprosy would have been difficult to explain had it not been for the fact that, in films from the nasal membranes and from the serous fluid of the vesicles, colonies or masses of acid-fast bacilli were constantly found. Eventually the case came to the post-mortem table, the patient having died of a purulent pleurisy associated with streptococci in pure culture. It was then that Dr. Marchoux was able to ascertain for certain that he was dealing with an acid-fast organism differing from both the tubercle and the leprosy bacillus.

In films from all the organs, but particularly from the spleen, could be found masses of bacteria arranged in spherical globi and surrounded by resistant gelatinous material, or held together in little drops of fatty substance. These masses consisted of very fine short organisms arranged anyhow, and offering in this a contrast to lepra bacilli, which are usually arranged in bundles of parallel germs. Stained with warm carbol-fuchsin, they resisted decolorization by acids or alcohol, but were readily decolorized by xylene, toluene, acetone, ether and chloroform. After decolorization by means of wax solvents, the bacilli could no longer be stained with fuchsin, a character in itself sufficing to distinguish them from Koch's and Hansen's bacilli. The dimensions, shape, and arrangement in masses resembling little collections of red powder, and the way in which the individual elements disperse when the containing vacuole is ruptured, suffice to justify for the new germ the name, proposed for it by its discoverer, of *Mycobacterium pulviforme*. It is an organism of very small size, its dimensions being $0.5-1\mu$ in length by 0.25μ in breadth. The "masses" attain dimensions of from $2-20\mu$. The masses could be found in the enlarged spleen, in the liver, where they were less numerous, and in the bronchial and mesenteric glands.

The case is one of extreme interest, and excites keen speculation as to its real nature. It is much to be regretted that the description fails to provide information as to the results of cultural and inoculation experiments, or of histological observations.

S. L. C.

REVIEWS.

ROGERS (Leonard) [C.I.E., M.D., F.R.C.P., F.R.S., I.M.S. (Retd.)]. **Bowel Diseases in the Tropics : Cholera, Dysenteries, Liver Abscess and Sprue.**—pp. xvi + 475. With 16 figs., 10 plates, 2 charts and 3 diagrams. 1921. London : Oxford Medical Publications. Henry Frowde and Hodder & Stoughton, The Lancet Building, 1 & 2, Bedford Street, Strand, W.C.2. [Price 30s. net.]

It was a happy idea of Sir Leonard Rogers to combine in one volume the substance of his two earlier works on cholera and dysentery. This new volume on "Bowel Diseases in the Tropics" has given him the opportunity of revising both of them in accordance with his further experiences at Calcutta during the last eight or nine years. So assiduously has the author devoted himself to the study of these diseases that any opinions that he holds regarding them demand very careful consideration.

The clinical descriptions are excellent. The account of the symptoms of cholera could never have been written by anyone who had not had very great experience of this disease, and observed it in the true scientific spirit.

The title of the book is perhaps somewhat ill-chosen. There are very scanty allusions to any parts of the tropics other than India, although, especially of late years, a large amount of work on bowel diseases has been done in other countries. But the fact that Sir Leonard Rogers confines himself almost solely to his own observations does not diminish materially the value of the monograph. It represents the mature opinions of one who is entitled to write with authority on the subjects dealt with.

A more pertinent criticism is that the author deals almost entirely with the diseases as seen at the Medical College Hospital, Calcutta, where the conditions are quite exceptional for the tropics. For instance, in the case of cholera, when one sees described, as practical guiding lines for treatment, such procedures as the estimation of the specific gravity of the blood, of its chlorine content, the blood pressure, and differential leucocyte counts, one cannot help thinking that to insist on such refinements (well enough in their proper place—in a well-equipped hospital, with plenty of trained assistants, and where only a few cases are treated daily) is apt to oppress the mind of the unfortunate, over-worked medical officer, who has to deal with an epidemic of the disease under the usual conditions.

A somewhat undue proportion of the book is devoted to cholera, of which a very full description is given. The historical account, which is reproduced from the earlier book, is excellent, and of much more than sentimental interest. Such a story as that of the gradual acquisition of scientific knowledge of the nature of cholera must prove decidedly stimulating to anyone who desires to increase it.

There are many old, and many new, Indian reports on outbreaks of cholera : little reference is made to these. The conditions described so graphically by the old Anglo-Indian medical officers may be seen, with very little change, to-day. MURRAY (as quoted by HIRSCH), in his General Report for the Upper Provinces for 1868, says, describing the pilgrims hastening to their homes in wild flight and panic, on the appearance of the disease at Hardwar : "The moving mass crowded the road in a continuous stream for nearly a week at Meerut, where I remained to watch the course of the disease. This pilgrim stream carried with it cholera, which lined the road with victims, whose funeral pyres studded the surrounding fields, or whose bodies were thrown into the canal, or collected by the police and buried. The disease was communicated to the neighbouring towns and villages, and the pilgrims carried it with them to their homes over the whole of Hindustan."

It is, indeed, in circumstances such as these, that cholera has to be treated by most medical men. But Sir Leonard only refers to this in the most general terms.

The statistics given of the result of treatment in Calcutta are stimulating and of value, but one must remember that the conditions there are unusually favourable. It would have been of more general interest and of more practical advantage to give the results of treatment in the epidemic outbreaks at the big Indian bathing fairs, where Rogers's methods were followed by others than their author.

I cannot share Sir Leonard Rogers's fondness for statistical tables. In any case, as he himself admits, the figures given under the different diseases, in the Indian mortality tables, are notoriously of very little value, with the exception of those referring to the Army, the Jails, and a few other institutions under the direction of competent medical officers. Such a table, therefore, as that given on page 37, which professes to give the monthly provincial cholera death-rates for the whole of India, and which the author discusses at some length, cannot be taken very seriously by anyone who has lived in that country. These figures are compiled, in the first instance, by the village "chaukidar," or watchman, an ignorant rustic, whose remuneration is about four rupees a month, and who arranges his figures in accordance with local expediency rather than with the facts, even as he interprets them.

In the paragraphs on mortality from cholera, the figures of the annual reports of the Sanitary Commissioners with the Government of India, for British and Native troops, and the jail population, are quoted; but only those for the decade ending in 1908 are given. As these are the only Indian statistics derived from the returns of qualified medical men, they are of considerable importance. It would have enhanced the value of the book if use had been made of the later reports referring to the years after the hypertonic saline treatment came into general use.

The basis of Rogers's treatment is the effect of hypertonic saline injections upon the blood-condition. In "Cholera," a table is given showing these results in twenty-four cases. It is disappointing to find this same table here reproduced. Twenty-four cases are surely a very small foundation for so large a superstructure. Of course, I do not suppose that Sir Leonard Rogers has no notes of other cases bearing on this matter, but I think that he should have published them here.

The only important addition to the section on the blood-changes in cholera is a rather brief paragraph, reinforced, it is true, by two tables, on the Reduction of the Alkalinity of the Blood in the disease and its relationship to post-choleraic uraemia. Sir Leonard fully confirms the opinion of SELLARDS on this subject, and carries the matter considerably further as regards its practical applications.

The chapter on the diagnosis of cholera is very good. To those who have only a book knowledge of the disease it may seem that there can be no great difficulty about this; but Sir Leonard very rightly emphasises the fact that a good many cases present themselves in which an immediate diagnosis is not possible.

In the reviewer's opinion much of the rather elementary bacteriology of cholera might have been omitted.

In the chapter on treatment the author says that the subcutaneous injection of saline solutions "has been most frequently relied on in the treatment of cholera collapse during recent years in India." This, I think, must have been copied from the 1911 edition, and must have escaped the author's notice. Since that book appeared, practically every British and Indian medical officer has treated his cases according to Sir Leonard's recommendations.

Table No. XX, on page 189, is of the highest interest. It shows what can be done in favourable circumstances and by skilful hands. It is indeed a triumph for Sir Leonard Rogers to be able to record the results of treatment at the Calcutta Medical College Hospital during the years 1915-19, when hypertonic saline and alkaline injections combined with the internal administration of permanganates were used. During this period 1,429

cases were treated, with only 298 deaths. In other words, over 79 per cent. of the patients recovered.

The most important new detail, in the treatment now adopted, is the use of an alkaline solution, designed to counteract the "acidosis" of the blood in severe cases of cholera. The solution used is as follows:—

Sodium bicarbonate	..	..	..	160 gr.
Sodium chloride	..	..	..	90 gr.
Water	..	..	..	1 pint.

Rogers now uses one pint of this alkaline solution in every case requiring an intravenous injection.

He rightly lays stress upon the high febrile reaction which frequently follows large saline injections, and advocates that they be given at a temperature considerably below that of the blood if the rectal temperature is high. If the rectal temperature exceeds 102° F. he does not warm the saline solution at all.

The chapters on dysentery are very good; and the fine coloured plates of the bowel lesions in amoebic and bacillary dysentery, which first appeared in the original edition, are reproduced. There are many alterations and additions, though most of the tables on liver abscess are copied from the old book. There is an excellent account in Chapter VIII of the methods used for demonstrating the presence of *Entamoeba histolytica* in the stools; and the chapter on the treatment of amoebic dysentery is considerably amplified. Most readers would have welcomed a somewhat fuller account of bacillary dysentery; those also of Hill diarrhoea and sprue are rather inadequate.

The book shows evidence of rather hasty proof-reading. Besides some obvious misprints, one is surprised to find the old mis-spellings—"Tricomonas, Heterotrica, Mesneli"—which disfigured the earlier books, reproduced. In the preface, the *Tropical Diseases Bulletin* is referred to as the "Bulletin of Tropical Medicine."

"Bowel Diseases in the Tropics" will assuredly enhance the high reputation so deservedly enjoyed by Sir Leonard Rogers, and will be an indispensable *vade mecum* to all practitioners in the tropics. In such a vast field there must necessarily be certain points concerning which individual experiences and opinions differ. Sir Leonard Rogers's name will be written large for all time in the history of cholera and dysentery; but even to one with his great experience it is not given to write "Finis" to the account of any human disease.

H. J. Walton.

KOFOID (Charles A.) & SWEZY (Olive). **The Flagellate Infections of the Human Digestive Tract.**—*Nelson's Loose Leaf Encyclopedia of Living Medicine*. Vol. 5. (Chap. XX.) pp. 365-398. With 6 plates. 1921.

The flagellates of the human alimentary canal form a small but interesting group. Much has already been written about them, but in recent years few attempts have been made to sift and summarize our scattered knowledge of the group as a whole. Consequently, the present article, which is evidently designed as a comprehensive survey of the whole subject, will be eagerly studied by many workers—more especially as the senior author, Professor Kofoid, is already well known as the author of numerous publications on the flagellate Protozoa. During the Great War, moreover, he occupied a leading position among the workers engaged in studying intestinal protozoal infections in the American troops, and he has therefore had recent opportunities of obtaining a considerable first-hand knowledge of the subject. The reader will thus feel justified in approaching the present article with great expectations. He will look to see many a knotty point unravelled, and many a dark place illuminated by the light of a ripe zoological experience.

The authors have here attempted something more than the title of their work implies : for in addition to describing the intestinal and oral flagellates of man, they treat of the trichomonads recorded from the vagina and the lung, and of a variety of coprozoic organisms. Their reasons for including such forms are not, at first, easy to guess. But perusal of their work makes it clear that they are still in some doubt as to which of the flagellates described from man are truly coprozoic, and which are not ; and their apparently catholic interpretation of " the digestive tract " is, perhaps, explained by the following passage from the Introduction. " It is . . . to be expected from their structure and from our knowledge of their occurrence and distribution in other vertebrates, that the principal flagellate parasites of the intestine may have more generalized capabilities of tissue invasion than has hitherto been suspected or detected." Those who know what has already been " suspected or detected " in this line may feel somewhat staggered at the vista opened up by this remark : but they will doubtless, like the reviewer, take comfort from the thought that these dire discoveries have not, as yet, been made.

The brief introductory remarks are followed by a section dealing with the " Technique of Examination." This contains little that will be novel to readers of the *Bulletin*—except, perhaps, the modified eosin-iodine solution which is recommended for use in the examination of stools. The modification advocated consists in the employment of physiological saline solution—instead of water—for making up and diluting the stain : which seems to be merely the result of a misconception regarding the use of " physiological " solutions generally. It may be noted, further, that " formalin " (strength not stated) for " 5 minutes only " is given as an alternative to Schaudinn's fluid as a fixative for wet coverglass films of faeces. It is hard to believe that anybody who has tried this method for fixing protozoal cysts in human faeces could ever recommend it to others.

In the descriptive sections which ensue, attention is paid to the morphology and nomenclature of the following flagellates, together with discussions of their occurrence and pathogenicity, and of the diagnosis, pathology, and treatment of the various infections :—*Giardia enterica* (Professor Kofoid's new combination of names for *Giardia intestinalis*—resting, apparently, upon a mistake made many years ago by DIESING) ; "*Craigia*," with two species ; *Chilomastix davainei* (better known as *Ch. mesnili*) ; *Trichomonas hominis*, *T. vaginalis*, *T. buccalis*, "*T. pulmonalis* Schmidt," and "*Pentatrachomonas ardin delteili*" ; "*Tetrachilomastix intestinalis*" ; *Tricercomonas intestinalis* ; *Embadomonas intestinalis* ; "*Dutrichomastix hominis*" ; *Diplocercomonas soudanensis* ; *Enteromonas hominis*. All these are, apparently, regarded as valid and distinct species. It is a long list—too long, in the reviewer's opinion—and it is impossible to discuss, in this place, all that is said about these various organisms. The following two main points must, however, be noticed.

First, it will be found that the descriptions of some of these flagellates are conspicuously defective in certain important particulars. For example, in the accounts of *Giardia* and *Chilomastix* no mention is made of the size of these organisms, nor of the number and attachments of their flagella—points of capital importance in the description of any flagellate. The figures alone—including one of *Giardia* (Pl. 1, fig. 3) labelled "*Craigia enterica*"—can hardly be regarded as adequate substitutes for descriptions, and would surely puzzle anyone unfamiliar with these creatures.

Secondly, it appears to the reviewer that these deficiencies on the zoological side are by no means counterbalanced by the comparative wealth of medical detail which is offered. Indeed, on this side the descriptions appear to exceed, both in length and in precision, our present real knowledge of the subject. The authors appear to have compiled these sections in a spirit of almost incredible credulousness. It is clearly unwise to treat the observations and interpretations of all workers as though they were all equally accurate and trustworthy, and to attempt, without analysis and criticism, to add error and truth together. The inevitable

result of such a benevolent and uncritical attitude towards everybody's evidence is particularly striking in the section on "*Craigia*" and "*Craigiasis*." A critical examination of the available evidence has convinced the reviewer—and many others—that "*Craigia*" is a mythical creature. Nevertheless, this supposed organism is here resuscitated—apparently without any misgivings—and over three pages are devoted to it and to the disease which it is alleged to cause. It is even regarded as "one of the most important flagellate infections of the human intestine." But, notwithstanding the detailed descriptions here given of the distribution, pathology, pathogenesis, symptoms, complications, and treatment of "*Craigiasis*," it can hardly be doubted that the cautious protozoologist will still feel entitled to inquire whether, in the first place, "*Craigia*" has any existence at all: and upon the answer to this question he will base his valuation of the literature dealing with "*Craigiasis*." It is remarkable moreover, that in their account of "*Craigia*" the present authors include a flagellate which is apparently new. It possesses a single flagellum, and forms a small uninucleate cyst. Why it should be inserted in the life-cycle of "*Craigia*"—described by its discoverers as a rhizopod—is by no means evident; nor can it be regarded, on the evidence presented, as lending any kind of support to the very questionable accounts of the "genus" previously published.

From the list of species already given it will be seen that *Tricercomonas intestinalis*, *Diplocecomonas soudanensis*, and *Enteromonas hominis* are all duly enrolled here as distinct organisms, belonging to three separate genera and species. In the reviewer's opinion, the three names are, in all probability, merely synonyms—three names for one and the same species. "*Tetrachilomastix intestinalis* (Sangiorgi) 1917" appears to be the flagellate named "*Tetratricomastix*" by SANGIORGI;* but why it should be thus transferred to FONSECA's subgenus *Tetrachilomastix* is not explained. In the opinion of the reviewer the organism was probably not an intestinal flagellate at all, but a coprozoic species of *Tetramitus*—probably identical with ARAGÃO's "*Copromastix*."†

The new generic name "*Ditrichomastix*" is here proposed for the organism called "*Octomitius hominis*" by CHALMERS and PEKKOLA.‡ It will be generally agreed that the introduction of new names in works of this character is undesirable: but apart from this, it must be noted that there is good reason to doubt whether the organism itself really represents an independent genus—or even a distinct species. It is a very questionable form.

Scattered through the article there are many minor errors, or inexact statements. We may note, as examples, that the free (*i.e.*, unencysted) form of *Giardia* is termed (p. 370) its "*free living stage*"—a misleading expression which sounds strangely in the mouth of a zoologist. Again, the sucker of the same flagellate is incorrectly called a "cytostome" (or rather, by an evident misprint, a "cystome," while its margin is termed the "cystostomal rim"). The statement on p. 371, repeated on p. 372, that this flagellate was recorded by British workers more frequently in dysenteric than in non-dysenteric cases, is hardly a correct representation of the facts: and the assertion (p. 382) that the flagellate originally discovered by LEEUWENHOEK in his own stools in 1687 (a mistake for 1681) was probably *Trichomonas*, is one which the reviewer has elsewhere been at some pains to disprove.§ A remark, on p. 388, that "in cases of irruption of hepatic abscesses of amebic origin into the respiratory region almost any intestinal flagellate might accompany the infection," seems to imply some novel conceptions regarding the pathology of amoebiasis: but it is doubtless in agreement with the authors' belief—which few readers of the *Bulletin*

* See this *Bulletin*, Vol. 10, p. 251.

† *Ibid.*, Vol. 8, p. 16.

‡ *Ibid.*, Vol. 8, p. 134.

§ *Ibid.*, Vol. 16, p. 89.

are likely to share—that *Trichomonas* is frequently found in liver abscesses (p. 367).

The article concludes with an enumeration of thirteen "Flagellates of minor importance." These turn out to be merely a number of coprozoic organisms, catalogued with little attempt at critical determination. Among them we find such forms as "*Bodo asiaticus*," "*B. cruzi*," "*B. italicus*," "*B. javanensis*," "*B. urinarius*," "*B. weinbergi*," and "*B. stercoralis*"—an impressive list, but one which has now lost some of its terrors for those who, like the reviewer, regard all these names as mere synonyms of the long-familiar free-living species *Bodo caudatus* (Dujardin) Stein. But whether this be right or wrong, it is surely no longer possible for any up-to-date protozoologist to accept all these debatable organisms as valid species. It seems to the reviewer regrettable, moreover, that no real attempt is anywhere made to discriminate between the free-living and the entozoic species, nor to draw any clear lines of demarcation between parasitic, commensal, and coprozoic forms. This, in itself, has already introduced much confusion into a subject wherein none exists in nature.

Only a few references are given at the end of the article, though many authors are referred to by name and date in the text—not always correctly (e.g., "Lanfranchini," p. 366, a euphonious blend, apparently, of the two Italian investigators LANFRANCHI and FRANCHINI). But it is not very helpful, when one wishes to verify an author's statements, to be put off with such references as "Stiles (1915 a)" or "(1915 b)", which doubtless have a meaning for the authors themselves, but convey little to the world at large.

In conclusion, the reviewer will only say, for himself, that he has studied this work with increasing disappointment—amounting, in the end, almost to despair. The hopes with which he set out have not been fulfilled. He finds it difficult indeed to persuade himself that the authors can have devoted to the composition of the article that critical care and attention to detail which we have a right to expect of them, and which the subject itself merits: and he refuses to believe that the article, as a whole, accurately reflects the views of the most expert protozoologists in the United States at the present day.

Clifford Dobell.

DOBELL (Clifford) [M.A., F.R.S.] & O'CONNOR (F. W.) [M.R.C.S., L.R.C.P., D.T.M. & H.]. **The Intestinal Protozoa of Man.**—ix + 211 pp. With 8 plates and 2 figs. in text. 1921. London: Published for the Medical Research Council by John Bale, Sons & Danielsson. [Price 15s. net. Postage 1s.]

This admirable treatise, where a wealth of exact fact in accurate historical perspective is mirrored in a literary and artistic medium of much refinement, is meant to serve both the neophyte in protozoology whose circumstances merely necessitate a sound knowledge of intestinal protozoa, and the man of surer attainments whose purpose is higher mounted.

In a particularly well-delivered prologue we are introduced—and no one has qualified himself at greater pains than Dobell for the part of herald—to the original worthies of the piece: the illustrious Antony VAN LEEUWENHOEK, Father of Protozoology, who in 1681 discovered and described the little flagellate now known, through Mr. Dobell's own laborious researches, as *Giardia intestinalis*; DAVINE (1854), who at a long interval brought two more flagellates out of the human *sella*; MALMSTEN (1856), the discoverer of *Balantidium coli*; KJELLBERG (1860), who first encountered the organisms now known as Coccidia in the human bowel; and Timothy LEWIS (1870) and D. D. CUNNINGHAM (1871), who first detected amoebae in human stools. By these elegant twofold introductions we are led into the classification of the Protozoa as a union of four great stocks or phyla—Rhizopoda, Mastigophora, Sporozoa and Ciliophora—which are all concisely defined.

In this prologue, too, the comparatively simple life-history of the intestinal protozoa is surveyed and brought into the practical perspective. The active period of freedom—or, at least, of active vitality—within the bowel is contrasted with the period of passive vitality or rest in a cyst outside the body, the one period quickly ending in death if the protection of the host's body is lost, the other being capable of persistence under suitable conditions of moisture for several weeks. Since the natural fate of the cyst is to pass out of the host's body, Dobell objects to the expressions "infected with cysts" and "cyst-carriers"; but this is really a case of thinking too precisely on the event, since these terms, if they are not sterling, are current counters acceptable to common sense: "medication which will kill the cysts in preference to the active forms," however, is villainous, and shows a most pitiful ignorance in him that uses it, and everyone will share the authors' disapproval of that phrase.

In considering the relations of the intestinal protozoa to their host the authors make it very clear how and why *Entamoeba histolytica*, *Balanitidium coli*, and the Coccidia are true parasites, and how and why *E. coli* is not; but in their most laudable desires to distinguish between parasitism and other kinds of mutual association which are harmless and non-parasitic, and to emphasize the view that most of the intestinal protozoa of man should be placed in the latter category, they rather confound the plain man's powers of perception by classing *Giardia intestinalis* apart as a "food-robber"—by much the same argument as Jack Easy's wet-nurse used to extenuate her equivocal maternity, that it was "only a little one" and therefore not very damaging to reputation. But when an organism—if only a very little one—sits in a man's duodenum and appropriates the man's chyme—what can it be called but a parasite sans phrase?

The very fine study of the intestinal amoebae is prefaced by some general remarks, where, among other things, attention is directed to those points—nuclear structure and cysts—which most plainly exhibit the specifically distinctive features. All the five species are clearly and critically described in their active and passive modes of existence, the synonymy of each is given, and the account is rounded off with a tabular synoptical summary. With all this lucid description, and the beautifully executed accompaniment of figures, it is difficult to imagine even a beginner going astray.

In the chapter on Amoebiasis, which, of course, relates exclusively to the doings of *E. histolytica*, the help and criticism of Captain S. R. DOUGLAS are acknowledged. Here *E. histolytica* is defined as a tissue-parasite invading the wall of the gut by a process of cytotoxicity. The authors conceive the amoeba as always—even in the very numerous cases, occurring in all parts of the world, where its presence in the gut causes so little inconvenience to its victim that the fact of its existence is entirely unsuspected—*always* at work destroying cells and eroding the mucous membrane, to ulceration. But "as a rule, the damage done to the gut wall of the host is compensated by regeneration on the part of the tissues. These are able to keep pace with the inroads of the amoebae, and a condition of equilibrium is thus established between host and parasite. Such a state of equilibrium must be regarded as the 'typical' or 'normal' condition in *E. histolytica* infections." We are in short, to imagine the infected person as being in the position of Prometheus, with amoebae perpetually gnawing at his gut and the gut renewing itself as fast as it is eaten away—but unlike Prometheus in suffering no torments during the process.

How and why this golden age of "harmony"—if that be harmony where the guest must always "produce a more or less pathological condition of the colon of its host"—degenerates into an iron age of discord and suffering is not explained: it is merely stated that in a certain proportion of cases "pathological conditions," instead of the typical or normal more or less pathological condition of destruction and regeneration, result.

The authors' explanation of the now well-established fact that infection with *E. histolytica* is consistent with perfect health may be the right one, but, after all, it rests upon assumption. It is an equally rational assumption

that in a healthy gut under normal conditions the amoebae might not be able to make way against living tissues, and might maintain an existence—hard and penurious for themselves and harmless to their host—on the exuviae of tissue: and if it be true that the therapeutic action of emetine is due to its effect on the intestinal mucosa, rather than on the amoebae, this assumption—namely, that the often harmlessness of the amoebae is due to the resistance of the tissues—becomes plausible enough to encourage those perhaps old-fashioned pathologists to whom the conception of an invading organism, of common occurrence, which is always eroding and ulcerating the lining of the colon, but generally does no harm, seems very strange—and all the more strange because in another place the authors do admit the possibility of some kind of natural resistance to infection, and a resistance which differs in individual degree.

Apart from these rather questionable pathological prolegomena, this chapter on amoebiasis as a full-blown entity contains a wonderfully clear account both of the pathological phenomena themselves and of their correlations with the parasite and its life-cycle. The practical bearings of the facts are also very appositely expounded: that a person in the acute stage of bloody evacuations with active amoebae in them is not infective, since the evacuated amoebae must quickly perish; that infection is brought about by swallowing cysts; that cysts, which are the essence of infection, are passed not only by convalescents from amoebic dysentery, but also from many persons classed as healthy because, though carrying a dormant amoebic infection, they know nothing whatever about it; that amoebic infection is extremely persistent, so that a convalescent carrier is long liable to relapses of dysentery and to other issues of amoebiasis, and a healthy unconscious carrier is liable to fall a victim to acute dysentery and other forms of amoebiasis at any moment; all these lessons are admirably enforced, along with the text that probably between seven and ten per cent. of the population of Britain and a much higher percentage in the tropics is infected with *E. histolytica*.

The higher percentage of infection in the tropics is probably one of many illustrations of the imperfect control yet exercised by man over what Hobbes styles "meer Nature" in tropical countries (outside the large cities modelled on those of Western Europe), and of the small impression yet made on native tropical communities by our sanitary ideals. The enormously higher percentage of the pathological manifestations of infection in the tropics is a matter which the authors think not worth discussion at present. Here, however, few medical men will agree with them. It is the important matter; and now that the specific limits of discussion are in this very volume so clearly defined and summarized and illustrated, for all men to comprehend, one of the greatest obstructions to useful discussion is removed.

In succeeding chapters the intestinal flagellates, coccidia, and ciliates are severally described, critically examined both in themselves and in their often complicated synonymy, and discussed in their ascertained and conjectural pathological bearings, in the same methodical way as the intestinal amoebae.

In the section on the flagellates—where *Embadomonas intestinalis* and *Enteromonas hominis* are not treated with quite the same sure and firm touch as the other species—the authors adhere to the opinion that "there is as yet no good evidence to prove that any intestinal flagellate found in man is pathogenic, but that there is very considerable evidence to show that most and probably all of them are harmless."

The section on coccidia and coccidiosis is appropriately prefaced with an account of the typical coccidian life-cycle, since specific distinctions are drawn from the oocysts and their contents, and the (probably transient) nature of a coccidian infection in man can only be inferred from general knowledge of the life-cycle acquired independently of man. Attention is directed to the fact that the coccidia of man, in their present geographical distribution, seem to be more domiciled in tropical and subtropical latitudes, and that the species most frequently found in man, *Isospora hominis*,

seems to have a centre in the countries of the Eastern Mediterranean region.

In the section on ciliates attention is concentrated on *Balantidium coli* and its pathological effects. *Balantidium minutum*, of which the authors admit only two authentic cases of infection, and *Nyctotherus faba*, of which they allow only one, are also figured and briefly described. Here, too, attention is very fitly given to a considerable number of ciliates that have been found at various times in human faeces and have even been invested with pathogenic attributes, but which have probably been accidentally introduced in the water or saline solutions used in manipulating stools. Some of these are rash identifications and are entirely questionable; others, such as Chilodon and Colpoda, are free-living forms of common occurrence. They are not to be confused either with the intestinal protozoa or with the Coprozoic fauna presently to be noticed.

It is difficult to overpraise the section on the diagnosis of intestinal protozoal infections, or to estimate its probable effect on the study of this branch of medical protozoology. I believe that only a man who knows what it is to live in an up-country station abroad, apart from professional associations, and has felt the bitterness of missing golden opportunities through technical inexperience or inexterity, can appreciate to the full this truly admirable section. Many such a man will, I feel certain, bless the name of Dobell. Here are to be found full and explicit directions for doing all that ought to be done and avoiding all that should be left undone in collecting material and preparing it for examination and treating it for permanent study; all the finger-posts and danger-signals; all the escort and attentive support of a chief scout.

In indicating common sources of error attention is drawn, among many other things, to living organisms which may be found in fairly fresh human faeces, but have not lived in the bowel nor been introduced in water or saline solution added to the stool afterwards. These organisms, which belong to the Rhizopoda and Mastigophora, are treated in a separate section, as the "Coprozoic Protozoa of Human Faeces."

The "Coprozoic" forms are free-living protozoa found naturally in water or decomposing organic matter. They may make their way into human faeces just as they do into organic infusions exposed to the air; or, in the encysted form, they may be swallowed in food or drink, and if the cysts survive the passage through the body they may excyst and proliferate in the evacuations: that they do not excyst within the gut is explained as probably due to the too-high temperature or to insufficiency of oxygen. The species of most common occurrence in human faeces are here described, and ten of them are figured: they include three species of amoebae, one shell-secreting amoeba, two species of Bodo, two of Cercomonas, one Copromonas and three other flagellates. This also is a most valuable section, and should prevent the discovery of many mares' nests.

An infinity of care and skill is embodied in the plates. One of the most happily conceived is Plate VIII, a triptych, the panels of which are identical in everything but the accessory detail of the constituent figures, displaying the cysts of the chief intestinal protozoa of man. In one panel they appear as when alive, in the next as when seen in iodine solution, and in the third as when fixed and stained with iron-haematoxylin. The figures are magnified 2,000 diameters; they are not ideal in the sense of being either visionary or diagrammatic, and they are not real (if one may so strain the term) in the sense of being either photographic or actual portrayal: their author calls them "semi-diagrammatic"—a definement by which they suffer perdition: they, rather, represent the distilled essence of a multitude of visual judgments, and are perhaps best described in the vernacular as "just It."

Since in the preface the principal author complains of sometimes being taken to task for not having sought to find out acceptable words for the

errors of other workers, it may be stated, in conclusion, that in the present volume no withers are wrung: the author may with a clear conscience say, like Descartes, "My design was solely to find assured certainty, and to throw aside the loose earth and sand so that I might reach the rock or the clay beneath."

A. Alcock.

CAULLERY (Maurice). **Le Parasitisme et la Symbiose.** (Encyclopédie Scientifique: Bibliothèque de Biologie Générale.)—400 pp. With 53 text figs. 1922. Paris: Librairie Octave Doin: G. Doin, Editeur. [Price 14 fr.]

Commensalism, symbiosis and parasitism are mysteries of adaptive evolution which have always attracted the biologist, and have enthralled and chastened the philosopher even more completely than has the "flower in the crannied wall."

Everyone is familiar with instances of commensalism, where two organisms of different kind are bound together, without derogation of their individual beauty and power, in a common life of mutual benefit; of symbiosis, where two organisms of different kind are so mingled and merged in an unified existence that they become a differentiated "tertium quid"; and of parasitism, where, of two organisms of different kind always living in association, one uses the other entirely for its own selfish ends and usually suffers some loss of beauty in the consequence. The three ideas are perfectly distinct; and yet, by extensive observation and consideration of Nature, we undoubtedly can pass without a break from the ethically-beautiful idea of necessary reciprocity illustrated by the most perfect instances of commensalism (*e.g.*, *Paguroopsis* and its adjustable overcoat of polyps), and the mechanically-beautiful idea of reciprocal necessity illustrated by the purest examples of symbiosis (*e.g.*, the algae and the fungi that compose the lichen), to the ugly perfection of a parasite such as *Sacculina*, which, in reducing its partner (ironically styled "host") to sexual impotence, itself becomes little better than a wart. And thus with Job we come, by a road of wonders and indirections, and almost incredible surprises, to the old conclusion that in Nature there are neither bounds and limits nor rights and wrongs, nor any beauties and uglinesses; but that these things exist only in the mind and heart of that most wonderful piece of work—Man.

In this book an immense number of instances of commensalism, parasitism, and other allied phenomena are collated and thoughtfully considered. The result may be commended to the medical profession, which, though not so free as the street-corner politician in its use of the term "parasite," is often inclined to ignore what may be called the alleviating and semi-alluring aspects of parasitism in the abstract. Particularly to be commended are Chapter X, where the reciprocal reactions of parasite and host are discussed; Chapter XI, dealing among other things with physiological aspects of symbiosis, and with hereditary symbiosis; Chapter XII, which leads up to the borderland between symbiosis and pathology; and Chapter XIII, which opens up speculations on the conception of cell-life and metabolism as a sort of microcosm of symbioses. In Chapter IX also there are some interesting discussions on the theory—with which the name of ROUBAUD is identified—of "biological prophylaxis" against insect "carriers" of disease.

A. Alcock.

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The bracketed abbreviations after the page numbers indicate the subject.

Am.	signifies Amoebiasis and Amobic Dysentery.	Mal.	signifies Malaria
Bb.	„ Beriberi	Misc.	„ Miscellaneous
Bl.	„ Blackwater	Oph.	„ Tropical Ophthalmology
B.R.	„ Book Review	Pel.	„ Pellagra
Chl.	„ Cholera	Pl.	„ Plague
Diet.	„ Dietetic Deficiency Diseases	R.F.	„ Relapsing Fever
Dys.	„ Dysentery (Bacillary & Unclassed)	Sc.	„ Scurvy
Ent	„ Enteric Fevers	Sk.	„ Skin Diseases
Fev	„ Fevers	Sp.	„ Sprue
Hel	„ Helminthiasis	S.S.	„ Sleeping Sickness
H.S.	„ Heat Stroke	Tb	„ Tuberculosis
K.A	„ Kala Azar	Und.	„ Undulant Fever
Lep	„ Leprosy	Ys	„ Yaws
		Y.F	„ Yellow Fever
		Z.	„ Medical Zoology

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 Findlay, W. F., 207 (Z.)
 Fischer, E. C., 78 (Oph.)
 Fisher, Walter, 279 (Misc.)
 Fleming, Norman B. B., 87 (Oph.)
 Flu, P. C., 195 (Z.), 286 (Misc.), 345 (Pl.), 356, 357 (Chl.)
 Fontes, A., 386 (Tb.)
 Fontoynt, 284 (Misc.)
 Force, J. N., with Leake, 293 (Misc.)
 Fowler, James K., 261 (Misc.)
 França, Carlos, 20, 197, 198 (Z.), 265 (Misc.)
 —, & Parrot, L., 196 (Z.)
 Franchetti, A., with Lustig, 226 (B.R.)
 Franchini, G., with Laveran, 28, 179, 180, 187 (Z.), 247 (R.F.)
 Fraser, A. D., 189 (Z.)
 Freeborn, S. B., with Herms, 17 (Z.)
 Frew, A., 272 (Misc.)
 Fróes, Joás A. G., 334 (Mal.)
 Fujita, Hidekazu, 116 (Hel.)
 Fujita, Takeshi, 26 (Z.)
 Fukuhara, Y., 357 (Chl.)
 Fülleborn, F., 26 (Z.)
 Funk, Casimir, & Dubin, H. E., 54 (Bb.)
 Furutama, T., 102 (Mal.)

G

- Ganguly, S. K., 84 (Oph.)
 Gardner, P. B., 128 (Hel.)
 Gastinel, P., with Teissier, Tanon, & Reilly, 348 (Pl.)
 Gastou & Pointoiseau, 242 (K.A.)
 Gatt, T. E. H., 238 (K.A.)
 Génévrier, J., 342 (Mal.)
 Genoesse, G., 92 (Mal.)
 Gerstenberger, H. J., 363 (Sc.)
 Ghosh, Sudhamoy, 402 (Lep.)

- Gill, C. A., 328 (Mal.)
 Ginsberg, Louis, 115 (Hel.)
 Giraud, with Tanon, 123 (Hel.)
 Girdwood A. I., with Young & others, 390 (Th.)
 Givens, Maurice H., & McClugage, Harry B., 56 (Sc.)
 —, —, & van Horne, E. G. 57 (Sc.)
 Glossina Sub-Committee, 24 (Z.)
 Godlewski, Henri, 362 (Sc.)
 Goldberger, Joseph, 213 (Pel.)
 Goldman, Alfred, 111 (Hel.)
 Gonzaga, A. Gavião, 266 (Misc.)
 Gotô, Senchu, 48 (Dys.)
 Graham, George Walter, 274 (Misc.)
 Grant, John B., 299 (Misc.)
 Grassi, B., 331 (Mal.)
 Greig, E. D. W., 291 (Misc.)
 Gregg, A. L., with Manson-Bahr, 35 (Am.)
 Greval, S. D. S., 101 (Mal.)
 Griffiths, T. H. D., 193 (Z.)
 Guérin, 283 (Misc.)
 Guerrero, L. E., & Concepcion, I., 374 (Diet.)
 —, —, Domingo, E., & Arguëlles, M., 258 (Ys.)
 —, with Monserrat, & Schöbl, 31 (Z.)
 Guinon & de Pfeffel, 348 (Pl.)
 Guteras, Juan, 248 (Y.F.)
 Gunn, Herbert, 39 (Am.)
 Gunn, J. A., & Heathcote, R. St. A., 31 (Z.)
 Gupta, J. C., with Mackie, 354 (Chl.)

H

- Hacker, H. P., 100 (Mal.), 117 (Hel.)
 Hackett, L. W., 132 (Hel.)
 Hallenberger, 257 (Ys.)
 Hamilton, C. S. P., 327 (Mal.)
 Hammond-Searle, A. C., & Stevenson, A. G., with Maret, P. J., 212 (Pel.)
 Harkness, A. H., 110 (Hel.)
 Harrison, G. A., 334 (Mal.)
 Harrison, W. T., 350 (Pl.)
 Harston, G. Montagu, 86 (Oph.)
 Hart, E. B., with Ellis, & Steenbock, 367 (Sc.)
 Hawarden, S. A., 272 (Misc.)
 Hawk, Philip B., Smith, Clarence A., & Bergeim, Olaf, 374 (Diet.)
 Heathcote, R. St. A., with Gunn, 31 (Z.)
 Hegner, R. W., 15 (Z.)
 —, & Payne, George C., 15 (Z.)
 Hehir, Patrick, 19 (Z.)
 Hele, T. S., with Wenyon, Anderson, McLav, & Waterston, 326 (Mal.)
 Henderson, E. Erskine, 82 (Oph.)
 Herms, William B., & Freeborn, Stanley B., 17 (Z.)

- Hess, Alfred F., 370 (Diet.)
 —, & Unger, Lester, J., 60 (Sc.)
 —, —, & Supplee, G. C., 366 (Sc.)
 Hijiya, S., & Sakamoto, M., 396 (Lep.)
 Hill, Athelstane, 37 (Am.)
 Hill, G. F., 196, 201, 203 (Z.)
 Hirota, T., 53 (Bb.)
 Hoare, Cecil A., 185 (Z.)
 Hobday, Frederick, 261 (Misc.)
 Hodson, Vincent S., 38 (Am.)
 Hoffman, Erich, 247 (R.F.)
 Hooper, Philip, 399 (Lep.)
 Hopkins, F. G., 369, 374 (Diet.)
 Hopkins, J. Gardner, with Strong, Shattuck, Sellards, & Zinsser, 149 (B.R.)
 van Horne, E. G., with Givens, & McClugage, 57 (Sc.)
 Horta, Parreiras, 400 (Lep.)
 Hoskin, Jenner, 38 (Am.), 89 (Mal.)
 Houghton, J. E., with Bloedorn, 245 (R.F.)
 Houssay, B. A., 208 (Z.)
 Hughes, C. A., with Stuckey, & Tomlin, 79 (Oph.)
 Hughes, Laurence H., 330 (Mal.)
 Hume, Eleanor Margaret, 58 (Sc.)
 Hunter, William, 149 (B.R.)
 Huntington, Ellsworth, 276 (Misc.)
 Hussey, L. D. A., with Macklin, 362 (Sc.)
 Hutchison, H. S., & Patel, P. T., 298 (Misc.)
 Hylkema, B., 340 (Mal.)

I

- Inaba, I., 53 (Bb.)
 Ingram, A., 101 (Mal.)
 —, with Carter, & Macfie, 199 (Z.)
 —, with Macfie, 295 (Misc.)
 Ikegami, Yutaka, 116 (Hel.)
 Isaïcu, with Levaditi, & Marie, 246 (R.F.)
 Iyengar, K. R. K., 102 (Mal.)
 Iyengar, M. O. Tirunarayana, 88 (Mal.)

J

- Java. Milit. Geneesk. Lab., 287 (Misc.)
 Jeanselme, E., 400 (Lep.)
 Jephcott, Harry, & Bacharach, Alfred Louis, 59 (Sc.)
 Jiménez, R., & Pittaluga, G., 343 (Mal.)
 Johannsen, O. A., 204 (Z.)
 Johnson, J. Pratt, 102 (Mal.), 175 (Z.)
 Johnson, W. B., 190 (Z.)
 Johnston, T. H., & Bancroft, M. J., 22 (Z.)
 Jordan, Karl, & Rothschild, N. Charles, 205 (Z.)
 Jung & Sell, 176 (Z.)

K

- Kawada, Keiji, 48 (Dys.)
 Keane, G. J., 148 (B.R.)
 Keersmakers, 43 (Dys.)
 Kellaway, C. H., 375 (Diet.)
 Kellog, W. H., 351 (Pl.)
 Kemmerer, T. W., with Boyd, 349 (Pl.)
 Kendrick, J. F., 133 (Hel.)
 Kennedy, J. C., 243 (R.F.)
 Keukenschrijver, N. C., 328 (Mal.)
 Kieffer, J. J., 199 (Z.)
 King, W. V., 99 (Mal.)
 Kirkpatrick, 83, 84 (Oph.)
 Klauder, J. V., with Schamberg, 252 (Ys.)
 Kleine, F. K., 177 (Z.)
 Klippel, & Monier-Vinard, 238 (K.A.)
 Koch, Walter, 361 (Sc.)
 de Kock, P. J., & Bonne, C., 214 (Pel.)
 Kofoid, Charles Atwood, 182 (Z.), 298 (Misc.)
 —, & Swezy, Olive, 410 (B R)
 Kohda, K., 399 (Lep.)
 de Korte, W. E., 293 (Misc.)
 Korthof, G., 246 (R.F.)
 Kraus, R., Dios, R., & Oyarzabal, J., 177 (Z.)
 Krauss, William, 50 (Sp.)
 Krosz, K., with Noller, & Arndt, 179 (Z.)
 Kubo, Kametarō, 22 (Z)
 Kudo, R., 189 (Z.)
 Kunhardt, J. C. G., & Chutre, G. D., 351 (Pl.)
 Kurita, T., 252 (Ys)

L

- Labastie, 332 (Mal.)
 Labbé, Marcel, 105 (Hel)
 Lafargue, with Castelain, 85 (Oph.)
 La Frenais, H. M., with Patton & Sundara Rao, 183 (Z.)
 Lamborn, W. A., 191, 193 (Z)
 Lamer, V. K., Campbell, H. L., & Sherman, H. C., 57 (Sc.)
 Lanc, Clayton, 120 (Hel)
 Lanzenberg, A., 91 (Mal)
 Large, D. T. M., 136 (Ent.)
 Larrousse, Fernand, 196, 198 (Z)
 Lasnet, 142 (Misc.)
 Lauber, Ilse, 45 (Dys.)
 Laveran, A., & Franchini, G., 28, 179, 180, 187 (Z.), 247 (R.F.)
 Lavier, Georges, 176 (Z.)
 Lea, J. Augustus, 79 (Oph.)
 Leake, James P., & Force, John N., 293 (Misc.)
 Lecoq, R., with Perrot, 373 (Diet.)

- Ledingham, J. C. G., 137 (Ent.)
 Léger, Louis, 195 (Z.)
 Léger, Marcel, 393 (Lep.)
 —, with Roubaud, 329 (Mal.)
 Leighton, William E., 334 (Mal.)
 Lejars, with Chauffard, Ronneaux, & Brodin, 114 (Hel.)
 Le Noir, P., & Richet, C., 374 (Diet.)
 Levaditi, C., Marie, A., & Isaïcu, 246 (R.F.)
 Levy, Moïse D., 341 (Mal.)
 Libert, E., with Carnot, 239 (K A)
 Lidenberg, Adolpho, 406 (Lep.)
 —, & Rangel Pestana, Bruno, 390 (Tb.)
 Lintz, Joseph, 290 (Misc.)
 Litman, M., with Siperstein, 279 (Misc.)
 Livingston, A. E., 266 (Misc.)
 Loewenhardt, Felix E. R., 45 (Dys.)
 Lombardo, C., 242 (K A.)
 López, J. A., 343 (Mal.)
 Loubrieu, with Paiseau, 91 (Mal.)
 Low, George C., & O'Driscoll, Elizabeth, 113, 123 (Hel.)
 Low, R. Bruce, 344 (Pl.)
 Lozada Benavente, Samuel, 294 (Misc.)
 Luger, Alfred, 219 (Und.)
 Lustig, A., & Franchetti, A., 226 (B.R.)
 Lutz Adolpho, 20 (Z.)

M

- McAll, P. L., 81 (Oph.)
 MacArthur, W. P., 138 (Ent.)
 MacCallan, A. F., 78, 87 (Oph.)
 —, & Beaton, E., 81 (Oph.)
 McCarrison, Robert, 150 (B R.), 371 (Diet.)
 McClelland, R. S., 362 (Sc.)
 McClosky, A. J., 52 (Bb.)
 McClugage, Harry B., with Givens, 56 (Sc.)
 —, —, & van Horne, 57 (Sc.)
 McCulloch, Irene, 186 (Z.)
 McDonagh, J. E. R., 242 (K A.)
 McDonald, J. T., & Dean, A. L., 403 (Lep.)
 Macfie, J. W. S., 124 (Hel.)
 —, with Carter, & Ingram, 199 (Z)
 —, & Ingram, A., 295 (Misc.)
 —, with Stephens, Yorke, Blacklock, Cooper, & Carter, 280 (Misc.)
 MacGregor, Malcolm E., 190 (Z.)
 McIntosh, John N., 259 (H.S.)
 Mackay, Malcolm, 215 (Pel)
 Mackenzie, J., 291 (Misc.)
 Mackey, G., 274 (Misc.)
 Mackie, F. P., & Gupta, J. C., 354 (Chl.)

- Macklin, A. H., & Hussey, L. D. A., 362 (Sc.)
 McLay, K., with Wenyon, Anderson, Hele, & Waterston, 326 (Mal.)
 Macleod, George, 41 (Dys.)
 MacNeal, Ward J., 211 (Pel.)
 McPherson, G., 85 (Oph.)
 Magath, Thomas Byrd, 25 (Z.)
 Malagueta, I., 250 (Y.F.)
 Malecinski, J., 358 (Chl.)
 Mansion, J., 19 (Z.)
 Manson, J. S., & Mitchell, H. A., 44 (Dys.)
 Manson-Bahr, P. H., 227, 313 (Dys.), 240 (K.A.)
 —, & Gregg, A. L., 35 (Am.)
 Maplestone, P. A., 15 (Z.), 111 (Hel.)
 Marchand, Werner, 202 (Z.)
 Marchoux, E., 407 (Lep.)
 Marie, A., with Levaditi & Isaïcu, 246 (R.F.)
 Martial, R., & Senevet, G., 208 (Z.)
 Martini, E., 18, 191 (Z.), 342 (Mal.)
 Maruyama, Y., 102 (Mal.)
 da Matta, Alfredo, 394 (Lep.)
 Maul, Herman G., 253 (Ys.)
 Mayer, M., 103 (Mal.), 263 (Misc.)
 Mazzoni, I., 239 (K.A.)
 Mead, S. W., with Dutcher, Eckles, Dahle, & Schaefer, 59 (Sc.)
 de Medeiros, Calixto, 48 (Dys.)
 Medical Research Council (Privy Council), 33 (Am.)
 Megaw, J. W. D., 261 (Misc.)
 Melhorn, K. C., 292 (Misc.)
 de Mello, Froilano, 401 (Lep.)
 —, & Brás de Sá, L. J., 195 (Z.)
 —, & do Carmo Vás, J. A., 296 (Misc.)
 Mendelson, R. W., 37 (Am.), 89 (Mal.)
 Mense, C., 274 (Misc.)
 Mesnil, F., 176 (Z.)
 Meyer, Jean, 220 (Und.)
 Michael, W. H., 297 (Misc.)
 Michel, P., with Morel, Mouriquand & Thévenon, 365 (Sc.)
 —, with Mouriquand, 60, 61, 366 (Sc.)
 Minagawa, Kôki, 121 (Hel.)
 Minett, E. P., 386 (Tb.)
 Mitchell, H. A., with Manson, 44 (Dys.)
 Mitchell, J. Alexander, 379 (Tb.)
 Miura, M., with Zilva, 367 (Sc.)
 Mohamed, S. G., with Watts, 296 (Misc.)
 Molloy, D. M., 126 (Hel.)
 Monier-Vinard with Klippel, 238 (K.A.)
 Monserrat, C., Schöbl, O., & Guerrero, L.E., 31 (Z.)
 Montfort, 350 (Pl.)
 Moreau, L., 63 (Tb.)
 Morel, A., Mouriquand, G., Michel, P., & Thévenon, L., 365 (Sc.)
 Morstatt, H., 175 (Z.)
 Motais, F., 82 (Oph.)
 Mottram, J. C., with Cramer & Drew, 372 (Diet.)
 Mouriquand, G., & Michel, P., 60, 61, 366 (Sc.)
 —, with Morel, Michel, & Thévenon, L., 365 (Sc.)
 Mühlens, P., 103 (Mal.)
- N**
- Naamé, 353 (Chl.)
 Nattan-Larrier, 30 (Z.)
 Neal, James Boyd, 80 (Oph.)
 Neukirch, P., 104 (Mal.)
 Neumann, Alfredo, 98 (Mal.)
 Neveu, R., 109 (Hel.)
 Newstead, R., 197 (Z.)
 —, & Evans, Alwen M., 203 (Z.)
 —, & Sinton, J. A., 197 (Z.)
 Nicholls, Lucius, 89 (Mal.)
 Niclot, 48 (Dys.)
 Nicolle, Charles, 238 (K.A.)
 —, & Conseil, E., 223 (Und.)
 Nigeria, 190 (Z.)
 van Nitsen, R., 251, 258 (Ys.)
 Nitzescu, J. J., 244 (R.F.)
 Noc, F., 187 (Z.)
 —, & Curasson, G., 29 (Z.)
 —, & Esquier, A., 68 (Tb.)
 Noël, P., 251 (Ys.)
 Noguchi, Hideyo, 249 (Y.F.)
 —, with Cohn, 249 (Y.F.)
 Nöller, W., 41 (Am.), 177 (Z.)
 —, Krosz, K., & Arndt, A., 179 (Z.)
 Notokworo, Haden Mas, with Stekhoven, Jr., 206 (Z.)
 Nuñez, M. F., 272 (Misc.)
- O**
- O'Connor, F. W., with Dobell, 413 (B.R.)
 O'Driscoll, E., with Low, 113, 123 (Hel.)
 Orenstein, A. J., 360 (Sc.)
 Orticoni, A., 142 (Misc.)
 Overbeck-Wright, A. W., 153 (B.R.)
 Oyarzabal, J., with Kraus & Dios, 177 (Z.)
- P**
- Pacheco-Luna, R., 82 (Oph.)
 Paiseau, G., & Loubrieu, 91 (Mal.)
 Pamela, with Tanon & Cambessedès, 110 (Hel.)
 Pantaleoni, Pio, 29 (Z.)
 Parrot, A., 19 (Z.)
 Parrot, L., 199 (Z.)
 —, with França, 196 (Z.)
 Patel, P. T., with Hutchison, 298 (Misc.)

Patrick, Adam, 242 (K.A.)
 Pattison, E. Seton, 260 (H.S.)
 Patton, W. S., 20, 25, 204 (Z.)
 —, La Frenais, H. M., & Sundara Rao, 183 (Z.)
 —, with Wright, 25 (Z.), 82 (Oph.)
 Payne, G. C., 129 (Hel.)
 —, with Hegner, 15 (Z.)
 Peking, 146 (B.R.)
 Penna, Belisario, 195 (Z.)
 Penna, José, & Barbieri, Antonio, 224 (B.R.)
 Pergola, M., 357 (Chl.)
 Perkins, Herbert, 34 (Am.)
 Perret, J. M., 397 (Lep.)
 Perrot, E., & Lecoq, R., 373 (Diet.)
 Perry, H. Marrian, 108 (Hel.)
 de Pfeffel, with Guinon, 348 (Pl.)
 Phisalix, Marie, 188 (Z.)
 Pi, H. T., 84 (Oph.)
 Pirie, J. H. Harvey, 267 (Misc.)
 Pitt, G. Newton, 98 (Mal.)
 Pittaluga, G., with Jiménez, 343 (Mal.)
 Plath, O. E., 202 (Z.)
 Plazy, with Dargein, 220 (Und.)
 Pondman, A., 288 (Misc.)
 Pontoizeau, with Gastou, 242 (K.A.)
 Porak, René, 284 (Misc.)
 Porter, J. W., 282, 290 (Misc.)
 Pozerski, E., with Eliava, 46 (Dys.)
 Pratt-Johnson, J., 88 (Mal.)
 Pringault, E., 15, 18, 19, 180 (Z.)
 —, 221 (Und.), 246 (R.F.)
 —, & Vigne, P., 29 (Z.)
 Przesmycki, F., 44 (Dys.)
 Purdy, W. C., 191 (Z.)
 Puntoni, Lino, 29 (Z.)

R

de Raadt, O. L. E., 256 (Ys.)
 Rangel Pestana, B., with Landenberg, 390 (Tb.)
 Ravaut, Paul, 241 (K.A.), 297 (Misc.)
 —, & Scheikevitch, 297 (Misc.)
 Regnault, Félix, 330 (Mal.)
 Reilly, I., with Teissier, Tanon & Gastinel, 348 (Pl.)
 Remlinger, P., 288 (Misc.)
 Rennie, P. M., with Acton, Curjel & Dewey, 335 (Mal.)
 Reuling, Fritz, 180 (Z.)
 —, & Rodenwaldt, E., 181 (Z.)
 Ribeiro da Fonseca, Olympio Oliveira, 182 (Z.)
 Richet, C., with Le Noir, 374 (Diet.)
 Risique Cebrian, R., & Vargas Pesado, A. Martinez, 241 (K.A.)
 Robert, Léopold, 245 (R.F.)
 Robertson, D. G., 381 (Tb.)
 Robertson, Wm., 405 (I.ep.)
 Rockefeller Foundation, 117 (Hel.), 299 (Misc.)
 Rodenhuis, Y., 39, 40 (Am.), 340 (Mal.)
 Rodenwaldt, E., with Reuling, 181 (Z.)
 Rodhain, J., 207 (Z.)
 Roger, Henri, 53 (Bb.)
 Rogers, Leonard, 404 (I.ep.), 408 (B.R.)
 Ronneaux, with Chauffard, Lejars & Brodin, 114 (Hel.)
 Root, Francis Metcalf, 16 (Z.)
 Rosenau, M. J., 374 (Diet.)
 Ross, Ronald, 338 (Mal.)
 Rost, E. R., 67 (Tb.)
 Rothschild, N. Charles, 205 (Z.)
 —, with Jordan, 205 (Z.)
 Roubaud, E., 190 (Z.)
 —, & Leger, M., 329 (Mal.)
 Roubier, Ch., 64 (Tb.)
 Roussel, J. N., 405 (Lep.)
 Rowe, Ch., 97 (Mal.)
 Royer, E. Ray, 119 (Hel.)
 Rozies, H., 221 (Und.)
 de Ruddere, A., 271 (Misc.)
 Rusca, Carlo Lamberto, 92 (Mal.)

S

Saceghem, René, 245 (R.F.)
 Saeki, Yoshihisa, 112 (Hel.)
 Sakamoto, M., with Hijiya, 396 (I.ep.)
 Salm, A. C., 300 (Misc.)
 Salom, C. E., 195 (Z.)
 Sarkar, Sarasi Lal, 264 (Misc.)
 Schaefer, O. G., with Dutcher, Eckles, Dahle, & Mead, 59 (Sc.)
 Schamberg, Jay Frank, & Klauder, Joseph Victor, 252 (Ys.)
 Scheikevitch, with Ravaut, 297 (Misc.)
 Schlesinger, W., 331 (Mal.)
 Schmitter, Ferdinand, 256 (Ys.)
 Schöbl, O., with Monserrat & Guerrero, 31 (Z.)
 Schut, H., 350 (Pl.)
 Schwartz, Benjamin, 105 (Hel.)
 Scott, Henry Harold, 175 (Z.), 376, 379 (Tb.)
 Seddik, Zaki, 78 (Oph.)
 Séguy, E., 18 (Z.)
 Sell, with Jung, 176 (Z.)
 Sellards, A. W., with Strong, Shattuck, Zinsser, & Hopkins, 149 (B.R.)
 Sen, D. N., 141 (Misc.)
 Senevet, G., with Martial, 208 (Z.)
 —, & Vialatte, Ch., 207 (Z.)
 Sergeant, Edm., 188 (Z.), 284 (Misc.)
 —, & Espérandieu, G., 188 (Z.)
 Sergeant, Étienne, 187 (Z.)
 —, & Edmond, 96 (Mal.)
 Sewell, R. S., 124 (Hel.)
 Seyfarth, Carly, 105 (Hel.)

Shattuck, George C., with Strong, Sellards, Zinsser & Hopkins, 149 (B.R.)
 Shaw-Mackenzie, J. A., 391 (Tb.)
 Sheasby, Herbert, 61 (Sc.)
 Sherman, H. C., with Lamer & Campbell, 57 (Sc.)
 Sherwood, Walter A., 115 (Hel.)
 Shorten, J. A., 373 (Diet.)
 Shortt, H. E., with Christophers, 325 (Mal.)
 Simon, Sidney K., 51 (Sp.)
 Sinton, J. A., 242 (K.A.), 243 (R.F.)
 —, with Newstead, 197 (Z.)
 —, with Thomson, 240 (K.A.)
 Siperstein, David M., & Litman, Morris, 279 (Misc.)
 von Skramlik, 79 (Ophi.)
 Smith, C. A., with Hawk & Bergeim, 374 (Diet.)
 Snapper, J., 357 (Chl.)
 Snijders, E. P., 187 (Z.)
 Snow, William F., 273 (Misc.)
 Sobhy & El Kattan, 83 (Ophi.)
 Sollmann, Torald, 279 (Misc.)
 Souleyre, C., 222 (Und.)
 Southwell, T., 19 (Z.)
 Spencer, Robert D., 242 (K.A.)
 Stanislas, 342 (Mal.)
 Stanton, R. E., with Sullivan & Dawson, 216 (Pel.)
 Steenbock, H., with Ellis & Hart, 367 (Sc.)
 Stekhoven Jr., J. H. S. & Notokworo, H. M., 206 (Z.)
 Stephens, J. W. W., Yorke W., Blacklock, B., Macfie, J. W. S., Cooper, C. F., & Carter, H. F., 280 (Misc.)
 —, & Adler, S., 397 (Lep.)
 Stevenson, A. C., & Balfour, Andrew, 289 (Misc.)
 Stevenson, A. G., with Hammond-Searle & Marett, 212 (Pel.)
 Stewart, F. H., 105, 122 (Hel.)
 Stimson, A. M., 289 (Misc.)
 St. John J. H., 341 (Mal.)
 Strasburger, J., 42 (Dys.)
 Strassberg, Maximilian, 215 (Pel.)
 Strong, Richard P., Shattuck, George C., Sellards, A. W., Zinsser, Hans, & Hopkins, 149 (B.R.)
 Stuckey, E. J., Tomlin, H., & Hughes, C. A., 79 (Ophi.)
 Sugiyama, S., 343 (Mal.)
 Sullivan, M. X., 217 (Pel.)
 —, Stanton, R. F., & Dawson, P. R., 216 (Pel.)
 Sundara Rao, with Patton & La Frenais, 183 (Z.)
 Supplee, G. C., with Hess & Unger, 366 (Sc.)

Surrel, 113 (Hel.)
 Sütterlin, Theobald, 178 (Z.)
 Suyeyasu, Yoshio, 107 (Hel.)
 Swan, John M., 143 (Misc.)
 Swellengrebel, N. H., 195 (Z.)
 —, & Swellengrebel de Graaf, J. M. H., 194 (Z.)
 Swezy, O., with Kofoid, 410 (B.R.)
 Swynnerton, C. F. M., 22 (Z.)

T

Takatsuki, Akira, 190 (Z.)
 Takeda, Saburo, 26 (Z.)
 Tamura, Harukichi, 116 (Hel.)
 Tanner, W. F., & Echols, G. L., 211 (Pel.)
 Tanon, Cambessedès & Pamela, 110 (Hel.)
 —, & Giraud, 123 (Hel.)
 —, with Teissier, Gastinel & Reilly, 348 (Pl.)
 Taylor, J. A., 273 (Misc.)
 Teissier, P., 348 (Pl.)
 —, Tanon, L., Gastinel, P., & Reilly, L., 348 (Pl.)
 Tempelaar, H. Ch. G., 341 (Mal.)
 Thévenon, L., with Morel, Mouriquand & Michel, 365 (Sc.)
 Thomson, J. Gordon, & Sinton, J. A., 240 (K.A.)
 Thomson, J. Oscar, 144 (Misc.)
 Thomson, T., with Castellani & Douglas, 295 (Misc.)
 Tjissen, J., 265 (Misc.)
 Tixier, L., & Bidot, Ch., 91 (Mal.)
 Tomlin, H., with Stuckey & Hughes, 79 (Ophi.)
 Tozer, Frances M., 364 (Sc.)
 Traubaud, 385 (Tb.)
 Treston, M. L., 242 (K.A.)

U

Uganda, Bact. Dept., 285 (Misc.)
 Unger, L. J., with Hess, 60 (Sc.)
 —, —, & Supplee, 366 (Sc.)
 Uriarte, Leopoldo, 351 (Pl.)

V

Vallet, 144 (Misc.)
 Vampré, Enjolras, 301 (Misc.)
 Vargas-Pesado, A. M., with Risique, Cebrian, 241 (K.A.)
 Vaughan, Warren T., 303 (B.R.)
 Vedder, Edward B., 359 (Sc.)
 Veras, Solon, 97 (Mal.)
 Verhoef, A. W., 262 (Misc.)
 Vialatte, Ch., with Senevet, 207 (Z.)
 Vickery, Robert K., 19 (Z.)

Vigne, P., with Pringault, 29 (Z.)
 Vincent, H., 47 (Dys.)
 Vuillet, with Colombani, 384 (Tb.)

W

Waite, J. H., 134 (Hel.)
 Walker, P. H., 56 (Sc.)
 Walker, Ronald R., 356 (Chl.)
 Walsh, J. H. Tull, 69 (Chl.)
 Waterston, J., with Wenyon, Anderson,
 McLay & Hele, 326 (Mal.)
 Watts, R. C., & Mohamed, S. G.,
 296 (Misc.)
 Wayson, James T., 405 (Lep.)
 Wenyon, C. M., 182 (Z.)
 —, Anderson, A. G., McLay, K.,
 Hele, T. S. & Waterston, J., 326
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